THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[Registered as a Newspaper.]

Vol. XXXV. No. 887.] LONDON, MAY 11, 1880. [32nd Year. Price 6d.

GAS PURIFICATION
BY
OXIDE OF IRON.

COOKE BROS.,
CENTRAL DEPÔTS:
CO. DONEGAL, IRELAND;
LONDON DEPÔT:
BLACKWALL, E.;
OFFICES:
26, 27, & 28, FENCHURCH ST.,
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GENUINE TORBAY PAINT
And SPECIAL GASOMETER PAINT.
Several Prize Medals. Established over 20 Years.
These Paints are now used by all the London Gas Companies and most of the principal Country Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. Also used by the Admiralty, War Office, Railway Companies, Founders, &c. They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations; do not crack, blister, or flake off; will cover tar effectually.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
Supplied, mixed ready for use, or in paste, as desired.
TORBAY PAINT COMPANY.
Proprietors: STEVENS & CO.,
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Works: BRIXHAM, TORBAY.

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Tubes and Fittings for Gas, Steam, Water, and Hydraulic purposes, plain, galvanized, white enamelled inside, or coated by Dr. Angus Smith's process, or oxidized by Professor Barff's patent process. Gas-fitters tools, brass cocks, &c.

JOHN SPENCER,
VULCAN TUBE WORKS,
WEST BROMWICH, STAFFORDSHIRE,
AND
97, CANNON STREET, LONDON.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a Prize Medal was awarded at the Great Exhibition of 1851, for "Gas-Retorts and other Objects in Fire-Clay," and they were also awarded at the International Exhibition of 1862, the Prize Medal for "Gas-Retorts, Fire-Bricks, &c., for Excellence of Quality."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
COWEN'S GARESFIELD COALS.
Jos. Cowen & Co. are the only Manufacturers of Fire-Bricks and Clay Retorts at Blaydon Burn.

JOHN RUSSELL & CO.,
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Established at the commencement of Gas Lighting,
Manufacturers of
TUBES AND FITTINGS.
THREE PRIZE MEDALS,
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Head London Office:
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OLD PATENT TUBE-WORKS, WEDNESBURY.

JOHN BENT & SON,
BELL BARN ROAD, BIRMINGHAM,
Manufacturers of
WET AND DRY GAS-METERS,
Licensees and Manufacturers of
HUNTS
PATENT COMPENSATING METERS,
STREET-LAMPS, &c., &c.
Established 1830.

THOMAS PIGGOTT & CO.,
SPRING HILL, BIRMINGHAM,
Manufacturers of
TELESCOPIC & SINGLE GASHOLDERS,
Cast & Wrought Iron Tanks for Ditto,
And Gas Apparatus of every Description.
Marine, Tubular, Cornish, Plain, Furnace, Saddle, and Range Boilers.
Sugar, Saltpetre, and all kinds of Pans.
Roofs, Girders, and Bridges, and General Smith's Work.
London Offices: 97, CANNON STREET—
JAMES E. & SAMUEL SPENCER, Agents.

THE
"OTTO" GAS-ENGINE,
From ½ to 40 H.P. ind.

See Page 702.

CROSSLEY BROTHERS,
MANCHESTER AND LONDON.

THE
DUKE OF HAMILTON'S
LESMAHAGOW
CANNEL COAL.
AGENT:
JAMES M'KELVIE,
HAYMARKET,
EDINBURGH.
ESTABLISHED 1840.

GEORGE GLOVER AND CO.,
PATENTEES OF THE
NATIONAL STANDARD GASOMETERS
AND MANUFACTURERS OF
IMPROVED DRY GAS-METERS.
GOLD MEDAL. HIGHEST AWARD.

INTERNATIONAL EXHIBITION,
SYDNEY, 1880.
RANELAGH WORKS, ROYAL AVENUE, CHELSEA, LONDON, S.W.
1, LANCASTER AVENUE, MANCHESTER.
Foreign Agents: DAHL BROS. Copenhagen; A. FAAS & CO., Frankfort-on-Maine; W. HOVEN & SON, Rotterdam; COPLAND & M'LAREN, Montreal; A. DEMPSTER, 57, Elizabeth Street, Melbourne.

WELLINGTON TUBE WORKS,

GREAT BRIDGE, TIPTON, STAFFORDSHIRE.

JOSEPH AIRD,

GAS, STEAM, AND HYDRAULIC TUBES AND FITTINGS.

NO MORE WASTE LIME! SAVE THE VALUABLE PRODUCT!

G. R. HISLOP'S PATENT REGENERATIVE PROCESS

Most Effectively and Economically restores this waste *ad infinitum*.

The Patentee having devoted more time and attention to this subject than perhaps any other person living, is now in a position to recommend the adoption of this process to Gas Companies and Corporations with the utmost confidence in its practical utility, convenience, and economy. 1st. It restores the spent Lime at from one-third to one-half its original cost, apart from its undoubted convenience and the economy of space. 2nd. There is practically no limit to the duration of the Lime. 3rd. The cost of apparatus for the introduction of the process is very moderate and exceedingly durable. 4. The Patentee supplies special bricks and castings, erects and proves the process on the most favourable terms.

The process, in operation, may be seen at the Corporation Gas-Works, Paisley, where the Lime has been restored 120 times. Inspection is cordially invited.

For Terms, apply to GEO. R. HISLOP, F.C.S., Engineer, Gas-Works, PAISLEY, N.B.

ROBT. DEMPSTER & SONS,

GAS ENGINEERS, IRONFOUNDERS, AND CONTRACTORS,

ROSE MOUNT IRON-WORKS, ELLAND, YORKSHIRE.

MANUFACTURERS OF EVERY DESCRIPTION OF

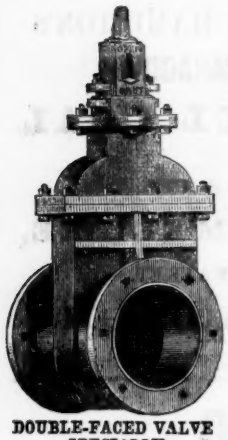
GAS APPARATUS;

CONTRACTORS FOR THE

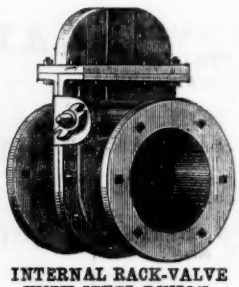
ERECTION OF PUBLIC AND PRIVATE GAS-WORKS.

Plans and Specifications Prepared, and Illustrated Catalogues forwarded on application.

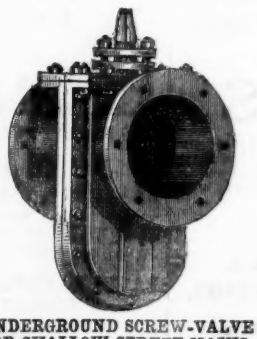
C. & W. WALKERS' GAS-VALVES.



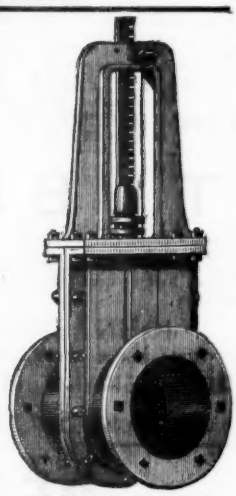
DOUBLE-FACED VALVE SPECIALLY FOR PURIFIERS.



INTERNAL RACK-VALVE WITH STEEL PINION, FOR GENERAL USE.



UNDERGROUND SCREW-VALVE FOR SHALLOW STREET-MAINS.



ORDINARY RACK AND PINION VALVE.

MIDLAND IRON-WORKS,

DONNINGTON, near NEWPORT, SHROPSHIRE; 8, FINSBURY CIRCUS, LONDON.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;

LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;

HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.,

GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

TELESCOPIC & SINGLE GASHOLDERS,

CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

LONDON OFFICES: 97, CANNON STREET—JAMES E. & SAMUEL SPENCER, AGENTS.

PORTBURY, PATERSON, & CO.,

WET AND DRY GAS-METER MANUFACTURERS.

STATION-METERS, PRESSURE-GAUGES, &c., of the Highest Excellence only.

VICTORIA METER-WORKS, EXETER.

MESSRS. FLETCHER, BURROWS, & CO.,

ATHERTON COLLIERIES, near MANCHESTER,

ARE PREPARED TO MAKE CONTRACTS FOR THE SUPPLY OF

CANNEL AND OF THEIR **ARLEY MINE GAS COAL,**

WHICH ARE OF ACKNOWLEDGED EXCELLENCE.

Their Coal is in use in the Salford, Stafford, Bolton, and other large Gas-Works in England, Ireland, Wales, and Abroad, giving in practical working 10,300 feet of 17-candle Gas, and 15 cwt. of superior Coke per Ton of Coal.

EDWARD E. CROMBIE & CO.,

INVENTORS AND PATENTEES

OF THE

FRICTIONLESS DRY GAS-METERS,

Beg to intimate to Gas Companies and others that they are now prepared to supply these very superior Meters at the same prices as for the ordinary Gas-Meters.

In the construction of this Meter, for which the best tin plates only are used, every mechanical contrivance has been taken advantage of successfully to reduce the friction to a minimum, which is amply proved by the fact that they are made to work upon only one-fortieth of an inch pressure. By an improvement also in their construction, a steadier light is obtained, and greater capacity than can be got from any other Meter in the market. No gas can pass under the valves on any back pressure, as is the case with many other Dry Meters.

To Gas Companies supplying gas through streets with heavy gradients, these Meters are invaluable, as much gas is saved from the low pressure required to work them.

ALL METERS ARE UPHELD FOR FIVE YEARS.

METROPOLITAN WORKS, DIANA PLACE, EUSTON ROAD, LONDON, N.W.

DANIEL HOWARD,

(Successor to the late BENJ. WHITEHOUSE),

GASHOLDER AND BOILER WORKS,

WEST BROMWICH, NEAR BIRMINGHAM (Established 1765),

MANUFACTURER OF

TELESCOPIC AND SINGLE GASHOLDERS,

WROUGHT AND CAST-IRON TANKS FOR DITTO.

PURIFIERS, CONDENSERS, SCRUBBERS, HYDRAULIC MAINS, AND ALL KINDS OF GAS APPARATUS.

WROUGHT-IRON ROOFS, BRIDGES, GIRDERS, ETC.

STEAM, HOT WATER, AND RANGE BOILERS, TANKS, CISTERNS, BOATS,

AND ALL KINDS OF WROUGHT-IRON WORK.

Drawings, Specifications, and Estimates supplied on application.

GAS PURIFICATION

BY

OXIDE OF IRON.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.

JOHN WM. O'NEILL, Managing Director.

GAS *v.* ELECTRIC LIGHT.

WIGHAM'S PATENT LIGHTHOUSE GAS-BURNERS,

For Street Lighting and the Illumination of Large Halls, Factories, Ship Yards, &c., where Powerful Light is required.

These Burners have been adopted by a School Board, having large school-rooms in charge, because of their high illuminating power and the facilities they give for perfect ventilation. The actinic power of these Burners is such that they are used successfully for Photography and Photo-Lithography.

SOLE MANUFACTURERS:

J. EDMUNDSON & CO., Gas Engineers, 19, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

GEORGE BOWER,

GAS AND WATER ENGINEER AND CONTRACTOR,

ST. NEOTS, HUNTS.

Gas Apparatus supplied for Works of any magnitude, from those suitable for experimental purposes to those capable of producing one million cubic feet per day.

VERTICAL RETORT APPARATUS for small Private Works, and for Testing Coal.

DOUBLE-ACTING RETORT APPARATUS for Producing Gas from Oil, Resin, Peat, Wood, and Coals.

RETORT-FITTINGS, CONDENSERS, SCRUBBERS, ENGINES AND EXHAUSTERS, PURIFIERS, STATION-METERS, GASHOLDERS, GOVERNORS, METERS, CENTRAL CHANGE VALVES, FOUR-WAY BYE-PASS VALVES, & VALVES OF ALL DESCRIPTIONS.

GASHOLDER TANKS, IN CAST OR WROUGHT IRON.

HIGH-PRESSURE AND CONSUMERS GAS-REGULATORS. WET AND DRY GAS-METERS.

APPARATUS FOR LIGHTING RAILWAY CARRIAGES WITH GAS.

AIR-LIGHT APPARATUS.

LAMP COLUMNS, SHADOWLESS HEXAGONAL LANTERNS on the Interchangeable Principle.

Plans, Specifications, and Estimates for Gas-Works of any magnitude.

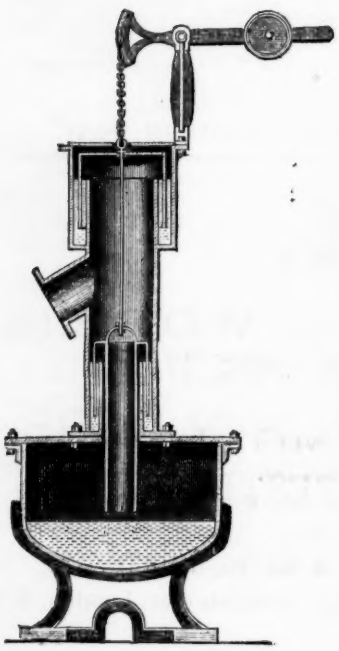
References in every Quarter of the World to Works erected during the past Quarter of a Century.

Second Edition of "The Gas and Water Engineer's Book of Reference," 4s. Companion, with Detailed Costs, 1s., post free.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



The following Testimonials, as to five years constant working of this Patent Removable Dip, have been received:—

Metropolitan District Asylum Gas-Works, Caterham, Surrey, Jan. 15, 1874.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiries, I beg to inform you that since I have used your Patented Dips (ten in number), I find my make has increased over 1000 cubic feet per ton of coal carbonized, my usual make being 9070 cubic feet before using your Dips, and 10,150 cubic feet since using them.

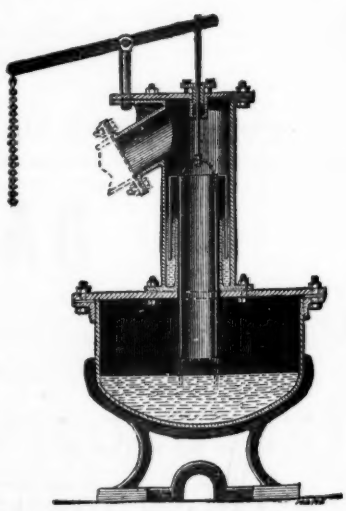
Metropolitan District Asylum Gas-Works, Caterham, Surrey, Dec. 30, 1879.

Messrs. CHANDLER and SONS.

DEAR SIRS,

In reply to your inquiry, it is with very much pleasure that I endorse every word of my letter of Jan. 15, 1874; and I may add that from the date the Patent Dips were fitted, they have worked perfectly, and there is very little carbon deposited in the retorts, in consequence of the lower pressure.

Yours faithfully,
(Signed) W. CRICKMAY,
Memb. Soc. Engineers.



APPLICATIONS TO BE MADE TO

Messrs. CHANDLER & SONS,

104, NEWINGTON CAUSEWAY, S.E.

KIRKHAM, HULETT, & CHANDLER, LIMITED.

PATENT "STANDARD" WASHER-SCRUBBER,

FOR

GAS PURIFICATION,

TAKES OUT EVERY TRACE OF AMMONIA AND A LARGE QUANTITY OF CARBONIC ACID AND SULPHURETTED HYDROGEN BY ONCE PASSING THROUGH THE MACHINE.

AMMONIACAL LIQUOR OBTAINED OF ANY REQUIRED STRENGTH.

The Cost of the Machine defrayed by the Ammonia obtained in Twelve Months.

It requires very little attention, and cannot get out of order.

THESE MACHINES HAVE BEEN SUPPLIED TO THE FOLLOWING GAS-WORKS:—

	Feet per Day.
The Gaslight Company, London—	
Beckton	5,000,000
Bromley	7,000,000
St. Pancras	3,000,000
Bradford Corporation	1,000,000
Bremen	150,000
Buxton Local Board	250,000
Dukinfield Local Board	500,000
Driffield Company	100,000
Goole Company	250,000
Glossop Company	300,000
Holywood Company	125,000
Heywood Local Board	600,000
Leeds Corporation	2,000,000
Leominster Company	150,000
Maidstone Company	1,000,000
Phœnix Company, Greenwich	2,500,000
" " Vauxhall	3,000,000
Woolwich Equitable Company	400,000
Yeadon Company	500,000

AND MANY ARE IN COURSE OF CONSTRUCTION;

Among others, four, for 3 million feet per day each, for the Corporation of Leeds; three, for 1¾ million feet each, for the Corporation of Salford; three, for 5 million feet, for The Gaslight and Coke Company, London; one, for 3 million feet, for the London Gas Company, Nine Elms, &c. &c.

TESTIMONIALS.

Messrs. KIRKHAM, HULETT, and CHANDLER. *Engine-Works, Millbank, Westminster, S.W., March 5, 1879.*

Gentlemen,—In accordance with your instructions, I have taken diagrams from Vertical Engine driving your Patent Horizontal Washer-Scrubber to purify 60,000 feet of gas per hour on the works of The Gaslight Company at King's Cross, and find the following results, viz.:—

Horse power required to drive engine, shafting, and gearing alone	= 0·398
Total horse power with washer on	= 1·721
Absolute horse power required to drive Washer-Scrubber	= 1·323

(Signed) THOS. HORN.

Messrs. KIRKHAM and HERSEY. *Phœnix Gaslight and Coke Company, Office, Greenwich, S.E., Aug. 12, 1879.*

Gentlemen,—In reply to your inquiry, one of your Patent Scrubber-Washers to purify 100,000 cubic feet per hour was put into operation at these works on the 1st of June. At the same moment the whole of our Scrubbers, equal to 28,000 cubic feet, were thrown out of use, leaving your Washer the whole work of freeing the gas from Ammonia. This it has done to perfection up to date. With 10 gallons of water to each ton of coal carbonized passing through it we get a clean test at the seventh chamber, leaving four chambers margin for extra work. The mean quantity of Ammonia in the inlet (fixed and free) obtained from a large number of tests was 241 grains per 100 feet of gas. On the outlet—Free Ammonia—Nil. The quantity of water used is 10 gallons per ton of coal carbonized. The strength of liquor as follows:—

Chamber No.	1	2	3	4	5	6	7	8	9	10	11
Strength of liquor—ounces	Nil.	Nil.	Nil.	Nil.	0·4	1·0	2·2	3·5	5·5	8·25	12·5

We are working five revolutions per minute. It takes out all the free Ammonia, reduces the carbonic acid and sulphuretted hydrogen 30 per cent., requires a very small amount of power to drive, and altogether is, in my opinion, the best machine for the purpose yet invented, and will, I feel confident, ere long, entirely supersede the Scrubbers of to-day. I am glad to find you are going to fix one of these Washers at our Vauxhall works.

(Signed) P. J. WATES, Engineer.

For Results and other Testimonials, see next week's Journal.

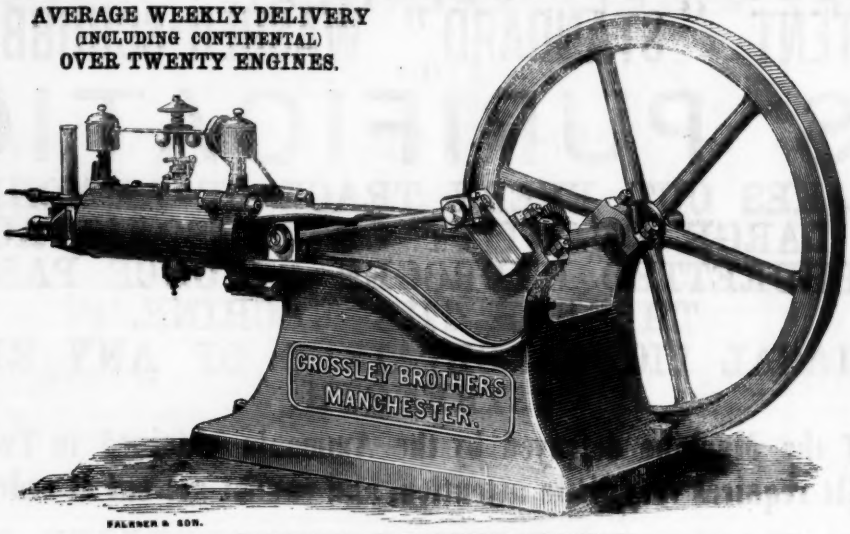
FOR FURTHER PARTICULARS AND TESTIMONIALS, ADDRESS MESSRS.

KIRKHAM, HULETT, & CHANDLER, LIMITED, 59 & 60, Palace Chambers, Bridge St. Westminster, London, S.W.

AN ENGINE WHICH WORKS WITHOUT A BOILER OR STEAM

AVERAGE WEEKLY DELIVERY
(INCLUDING CONTINENTAL)
OVER TWENTY ENGINES.

The durability of these Engines is now established by experience, one of them having run night and day at the Hinckley Gas-Works for over Twelve months without any expenditure for repair; this being equal to about 2½ years average work.



FALKNER & SON.

Over 2500 already delivered.

Very numerous Testimonials from Users, including Engineers, Men of Science, and others, on application to the makers.

No trouble with Coal, Ashes, Smoke, Insurance, Water, or constant attendance

No Glands to pack, or Water Gauges and Steam Gauges to watch.

STARTS AT A MOMENT'S NOTICE.

THE "OTTO" SILENT GAS-ENGINE.

(Otto and Crossley's Patents, 1876 and 1877.)

THEY ARE USED FOR ALL KINDS OF PURPOSES, CHIEFLY FOR EXHAUSTERS, SCRUBBERS, & PUMPS.

DELIVERED IN MANCHESTER. SIZES { NOMINAL HORSE POWER ½ 1 2 3½ 6 8 12 16 / MAXIMUM HORSE POWER ¾ 1½ 2½ 4 9 12 18 24 } OFFERED. CASES NOT CHARGED IF RETURNED FREE.

PRICES INCLUDE CAST-IRON STAND, TURNED FLY-WHEEL, AND DRIVING PULLEY; WATER-VESSEL, SEVERAL DUPLICATES, AND GAS-FITTINGS (EXCEPTING METER AND PIPES).

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CROSSLEY BROTHERS, MANCHESTER.

LONDON HOUSE:
116, Queen Victoria St., E.C

GAS COAL. GAS COAL. GAS COAL.

WELLS, BIRCH, RYDE, and CO., Limited,

HOYLAND SILKSTONE COLLIERIES,

Near BARNSLEY.

This Company is now in a position to raise **2000 tons per day of REAL OLD SILKSTONE GAS COAL.**

"The quality of this Coal for Gas purposes, if equalled, is not excelled by any on record, and the Coke competes successfully with best Durham."—See *Mining Journal*, Aug. 11, 1877.

Prices quoted to any Railway Station, or F.O.B. Hull, Grimsby, Goole, Keadby, Liverpool, and Fleetwood.

Full particulars will be sent on application to above address.

GOLDSMITH'S PATENT SIGHT WATER-LINE INDICATING GAS-METER.

MANUFACTURED BY GUEST AND CHRIMES,

FOUNDRY AND GENERAL BRASS WORKS,
ROTHERHAM;
AND 85, SOUTHWARK ST., LONDON, S.E.

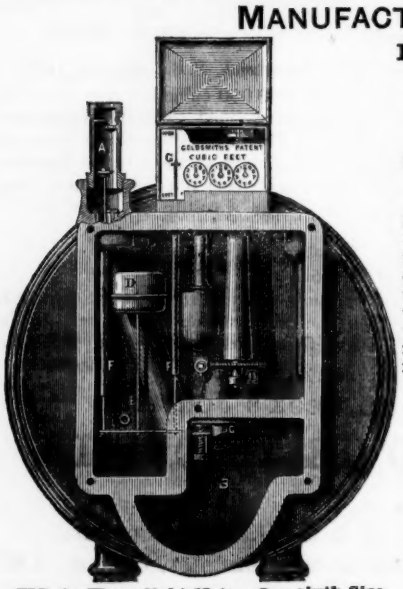


FIG. 1.—Three-light Meter, One-sixth Size.

Fig. 1 is a Meter with front removed to show the arrangement and connection of the Indicator and Valve.

Fig. 2 is front view of Index, with cover up.

The principal object of this invention is to render the water-line in the reservoir at all times visible. It will be seen, by reference to the illustrations, that this is accomplished in the following manner:—On the dial are the words "Open" and "Shut," and attached to the float is the pointer G, which rises and falls with the water-line in the reservoir. If the pointer is at "Open," it shows that the valve is open, and that the reservoir is full. If it is at "Shut," it shows that the reservoir is empty, and that the gas will be shut off.

The following ADVANTAGES will be obvious:—

1. The Inspector can see at a glance if the Meter requires water.
2. No more water than is required need be added, and therefore no water has to run out.
3. The Meter Inspector will be spared a great deal of his most objectionable work, and he will save a great deal of time and trouble.
4. The consumer will not always have to be asked for water, nor will he have to endure the unpleasant smell caused by waste water being run out.

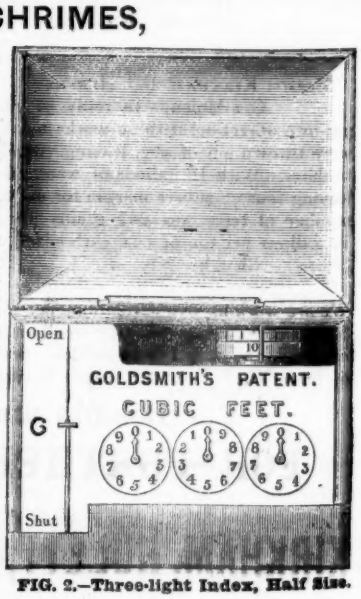
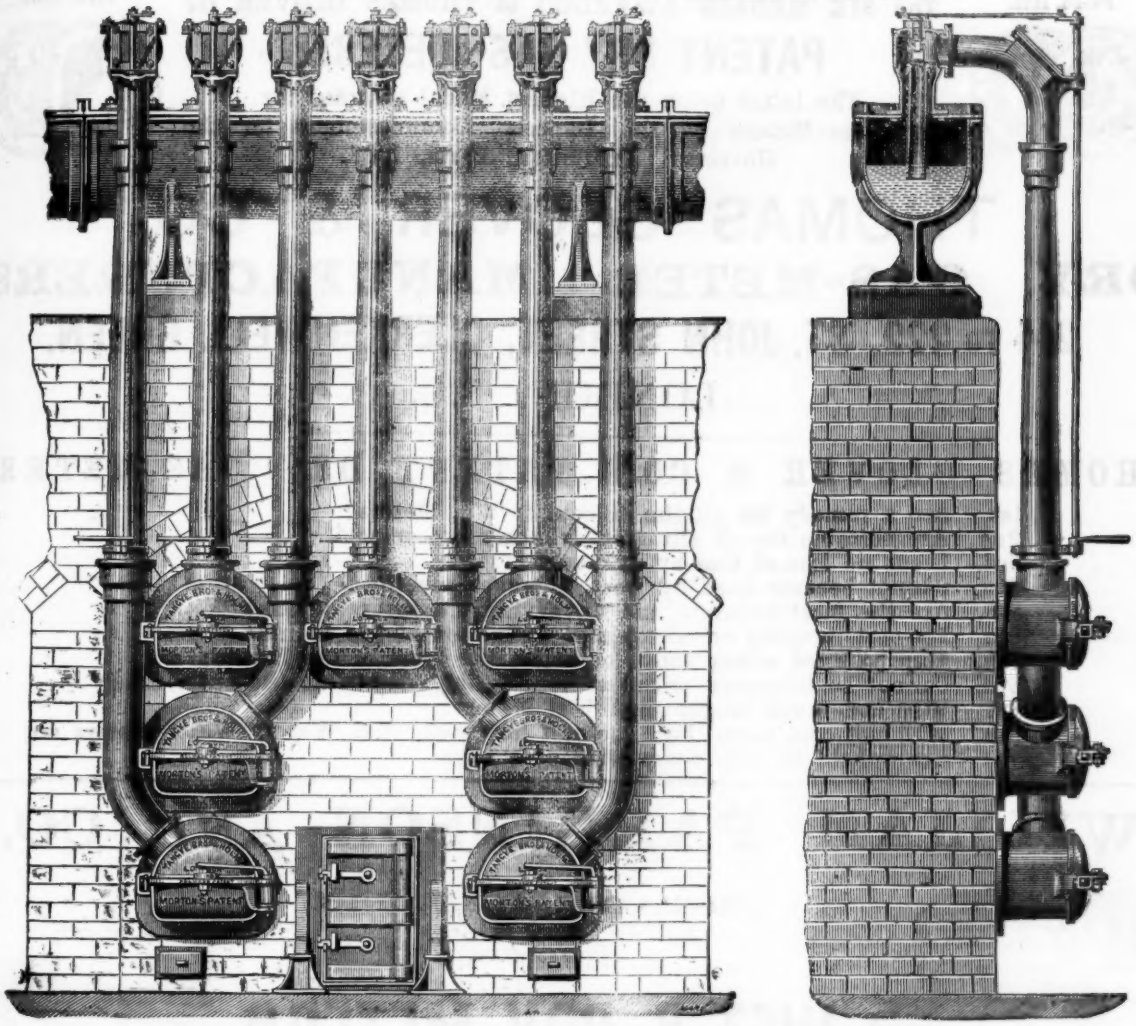


FIG. 2.—Three-light Index, Half Size.

HOLMAN'S PATENT
NON-PRESSURE VALVULAR SEAL-PIPES
FOR
HYDRAULIC MAINS.



The salient features of the above arrangement are as follows:—

1. The Seal is instantaneously opened and closed from the stage by the stokers.
2. There are only two positions for the actuating lever: one when the Seal is opened during the period of carbonization, the other when it is closed for drawing and charging the retort.
3. The retort can never be blocked, beause the port directing the gas *through* the Seal is always opened, and the port permitting the gas to *pass* the Seal *direct* into the hydraulic main is also open while the retort is at work.
4. The manager and stokers can always see at a glance, by the position of the lever, whether the retort is duly unsealed while carbonizing its charge.
5. There are no extraneous seals, stuffing-boxes, hinges, screws, chains, pulleys, springs, teeth, or other complication belonging to the valves; they are made plain and strong for rough use, and will last many years without renewal.
6. The valve faces are always covered and never separated, hence no foreign matter can put them out of action.
7. They are positive, reliable, interchangeable, free from all the uncertainty of automatic arrangements, and low in price.
8. No extra pipes or connections are required, because the Valvular Seal-pipe is self-contained in the single branch of the ascension-pipe, which stands on the hydraulic main, and is easily accessible by removing an ordinary cover secured by two bolts only.

(238) TWO HUNDRED AND THIRTY-EIGHT HOLMAN'S PATENT VALVULAR SEAL-PIPES are being fitted to the Hydraulic Mains at the Radford Station of the Corporation Gas-Works at Nottingham.

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Mr. MORTON writes in the following terms, under date of Feb. 3, 1880:—

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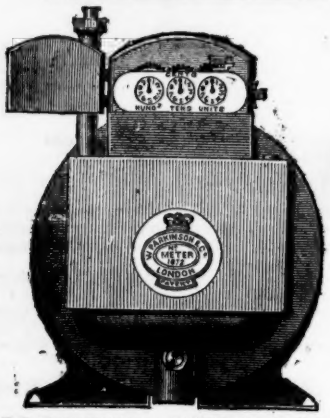

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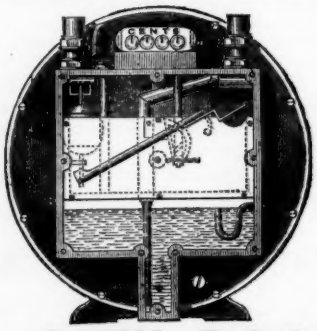

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TO CORRESPONDENTS.

RECEIVED.—"*Nature's Hygiene.*" *By C. T. Kingzett, F.C.S. London: Baillière, Tindall, and Cox.*—"*A Theoretical and Practical Treatise on the Manufacture of Sulphuric Acid and Alkali.*" *Vol. II. By G. Lunge, Ph.D., F.C.S. London: J. Van Voorst.*

CORRECTION.—*In the* JOURNAL *for the 20th ult., p. 596, the title of the case tried before Vice-Chancellor Malins, on April 15, should have been stated, as was manifest from the report, as Buenos Ayres Gas Company, Limited, and Bower v. Wilde.*

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

TO SUBSCRIBERS.

In consequence of the Whitsun Holidays, the next Number of the JOURNAL OF GAS LIGHTING *will not be published until Wednesday, May 19.*

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, MAY 11, 1880.

Circular to Gas Companies.

AT the meeting of the Manchester City Council last Wednesday, a report was submitted by the Town Clerk, Sir Joseph Heron, showing how the several Acts of Parliament in reference to the gas supply affected the appropriation of surplus profits. We cannot contest the Town Clerk's opinion, though we utterly dissent from his conclusions. Sir Joseph Heron's contention is that the gas undertaking of Manchester belongs to the ratepayers of the whole city. All these are not gas consumers, and therefore he argues that the gas profits belong to the ratepayers at large. We have always contended that the gas profits of corporate undertakings should be employed in the reduction of the price of gas. When Sir Joseph Heron argues that the improvements are paid for by the ratepayers at large, he makes a wide admission, for he knows very well that, in 1874, out of 79,600 ratepayers there were only 47,827 gas consumers. The reason, we take it, is obvious. Gas in Manchester is much too dear. If a liberal reduction in price were made, an enormous increase in the number of consumers and in the consumption would be the result. Let Sir Joseph Heron go to a score of towns in the North, where gas is cheap, and he will find that nearly every householder, and in many cases lodgers take a supply of gas; but the Corporations in these cases do not make "ten "per cent.," and apply but small portions of their profits to public purposes. Let him go farther north to Scottish towns, in which practically everybody is a gas consumer, and he will find that in these places all the profits of the gas undertakings are applied in the reduction of price. We have so often repeated that we are almost ashamed to reiterate, that the "Scottish system" is the only sound one for the management of a corporate gas undertaking. The Gas Committee draw up a series of estimates, showing what is likely to be the cost of the undertaking for the ensuing year, and what will probably be realized from the working, and having regard to these facts they fix the price for the following year. Here all is plain and straightforward. The inhabitants and the ratepayers consume the gas, and whatever profit remains over is carried to the advantage of the next year in a reduction of price. This, as we have repeatedly said, is, we consider, the true principle upon which corporate undertakings should be managed and the profits appropriated. Let Sir Joseph Heron argue as he likes, he knows very well that the present generation of ratepayers had nothing to do with the first arrangement of the gas undertaking. They came into the concern when all was settled, and the Gas Committee had begun their course of making "ten per cent." and appropriating a large sum for public improvements. We have always contested their right to do this, but Sir Joseph Heron attempts to make it clear that the Manchester Corporation have the power, under several Acts of Parliament, to apply the gas profits as they will. They have chosen to appropriate the greater part of these to what are called "public improvements." The magnificent City Hall, costing a million of money, is one; and others, costing no less, have been paid for out of gas profits. This looks all very well; still, we consider that the consumer, *quoad* consumer, is, to a certain extent, we will not say defrauded, but certainly deprived of his just rights, when gas profits which ought to go in reduction of price are applied in effecting what are called "public improvements." It is, however, no use arguing this question. Sir Joseph Heron, who is practically the Corporation of Manchester, will have every year a large slice out of the gas profits, and it is only fair to say that very few of the inhabitants object to this course of procedure.

The inhabitants of Gloucester are still dissatisfied with the price charged for gas—3s. 8d. per thousand feet—and they recently sent a deputation to wait upon the Directors of the Gas Company, and seek for a reduction to 3s. per thousand feet. They met with a courteous reception, but the *non possumus* argument was urged, and there the matter ended. It would be well for gas consumers to give the Directors of a Gas Company credit for knowing how to manage their own affairs, and to remember, as the Chairman of the Gloucester Company put it, that they are only trustees for the Shareholders, whose interests they are bound to protect. We will not go so far as to say that the Shareholders are, under all circumstances, entitled to their full maximum dividends, although there is much to be said in favour of the view that such dividends should be paid whenever the earnings of the Company permit it, without reference to the price it is necessary to charge for gas so as to accomplish this end.

Gas affairs at Stone are in a very confused state. As our readers have been informed, the Local Board a short time since desired to set up competing works, and for that purpose applied to the Local Government Board for a Provisional Order to authorize them to do so, and to enable them to raise the necessary funds. After an inquiry by Captain Hildyard, one of the Board's Inspectors, he reported that it was undesirable to have competing works in Stone, the town being too small to support two gas undertakings. There are some curious facts in connection with this case. The works of the Gas Company seem to be situated in the very heart of the town, and only lime purification has hitherto been resorted to. The result is that a certain amount of nuisance has been created, as our readers will well understand. Lime purification always involves unpleasant emanations, and is perfectly inadmissible in the centre of a town. It has been arranged, however, that for the future oxide of iron shall be used instead of lime; and this substitution will remove the principal cause of annoyance. But after this the Company will have to settle accounts with the Local Board. It seems doubtful how much

profit has been made by the Company. One authority puts it at nineteen per cent., and another at ten per cent., or a little under. The one thing wanted by the Company is an Act to incorporate them with statutory powers, and for this purpose they have announced their intention of applying to Parliament next year. This will, it seems, satisfy the Local Board. Let us hope that it will.

In another column will be found the full text of the valedictory address of Mr. R. Mitchell, of Coatbridge, the ex-President of the West of Scotland Gas Managers Association, delivered at the meeting of the Association on the 29th ult. He considers, as we said last week, that the electric "scare" has been beneficial to the interests of the gas industry, inasmuch as it has caused managers and others to look farther afield for new means of cheapening and improving the production of coal gas. We quite agree with Mr. Mitchell in his view that improvements are required in the retort-house and the means used for firing the retort-settings. It is the opinion of many gas managers that great improvements in this direction may be effected by the use of the Siemens or Oechelhäuser regenerator furnaces. The employment of these systems by Gas Companies would, of course, leave them with a large stock of coke in hand. They would then, as Mr. Mitchell said, have to go in "for small profits " and quick returns;" but this is scarcely satisfactory. We want to realize the full value of residuals, and not be required to make forced sales. Of course, the ex-President, like ourselves, is in favour of mechanical stoking. He is cautious not to express an opinion on any of the systems now under trial. Which of them is destined to come into most extensive use remains to be seen. It is not our province to express decided opinions when competing schemes are brought under our notice, and we shall not do so on this occasion—the rival inventors must fight for the merits of their own schemes. We content ourselves with thanking Mr. Mitchell for his interesting and instructive address, and are sorry we shall not hear more from him in his late capacity as President of the West of Scotland Association of Gas Managers.

The vaunted superiority of the electric light for lighthouse illumination—a superiority, however, not admitted by many of those well able to judge of its merits in this respect—is not always borne out in actual experience; as witness the following, which appeared in the daily papers at the close of last week:—The crew of the schooner *Conovium*, of Aberystwith, bound from London for Dublin, with cement, landed at Penzance on Wednesday morning, their vessel having struck on the Stag Rock, near the Lizard, on Tuesday night, and foundered. The captain attributed the disaster to the glare of the electric light at the Lizard, which made him believe that he was at a greater distance from the land than he actually was.

We would direct our readers attention to Mr. R. H. Patterson's article on the effects of temperature of gas and the air supply at the point of ignition upon the illuminating power of the gas, which appears in the present issue of the JOURNAL. On the 13th of January last we gave an account, translated from the *Journal für Gasbeleuchtung*, of a series of interesting experiments by Herr F. Siemens, on what he termed "Regene- "rative Gas Lighting"—that is to say, he described several ingeniously constructed appliances, by means of which the heat developed by the combustion of gas was made to warm the air and gas before they were allowed to combine at the point of ignition, the result being a decided increase in the illuminating power. Herr F. Siemens was led to make these experiments by the known success, in the furnaces which bear his name, of the principle of previous heating, by the waste heat of combustion, of the gaseous fuel and air for the production of intense heat; and as light is only a particular manifestation of intense heat, the inference might clearly be drawn that the agency which will increase the one would, if properly directed, also increase the other. The idea is not new, but practical difficulties have hitherto prevented its general embodiment in convenient and simple form; but it is just one of those principles, depending for success on certain characters in the materials and workmanship of the apparatus involved, which may have to wait many years after their first discovery until the time is ripe for their ultimate success. Mr. R. H. Patterson seeks to exemplify the bases upon which the utility of any process for previously heating fuel and air for combustion depend, with a view to the probability of further experiments in this direction, which, if properly directed and intelligently carried out, can scarcely fail to lead to useful results. It is scarcely necessary to refer to the increasing attention which is now being bestowed on gas-burners designed to give intense light, to show that no time could be more appropriate than the present for any researches which will tend to increase our knowledge of a field of utility for gas, which has so far been particularly fruitful, even with the very limited amount of labour which has been devoted to it; and we shall look for great progress in this particular matter during the next year. The success which has attended the efforts that have been made so recently to produce gas-lamps capable of illuminating large areas, and the amount of favour which, considering their novelty, they have received, permits us to indulge in the hope that other successful developments of the same idea will speedily follow. The most that can be advanced against the new "lighthouse" style of burners is that they necessarily consume a large quantity of gas. What is wanted now is a burner which, by intensifying the light yielded by the combustion of as much gas as an ordinary burner usually consumes, and which may perhaps be done by concentrating the heat carried off by the products of combustion, shall take an intermediate place between the humble bat's-wing and the concentric "lighthouse" Argand; and we trust that such a burner may be an accomplished fact in the near future. It is a subject to which many of our readers, as we are assured, might devote some research, with credit to themselves and advantage to the cause of gas illumination; and we trust that Dr. Siemens will not in this matter remain without rivals in this country.

On the subject of the benefit arising from the Gas Companies amalgamations carried out in the Metropolis during the last few years, there is a note in a small work recently published by Mr. J. Quick, jun., M. Inst. C.E. With the book itself—"The Water Supply of the Metropolis, and the Pro- "posed Transfer of the London Water Companies to a Public " Authority"—we are not concerned in this column (a notice of it appearing elsewhere); but, when referring to the benefit likely to accrue from centralization of management, the author, after acknowledging that the JOURNAL has constantly pointed out the advantages which would have accrued from amalgamation of interests, though "the [Water] Companies " have turned a deaf ear to the suggestion," writes as follows in regard to the Gas Companies:—"According to informa- "tion, for which we are indebted to Mr. J. O. Phillips, " Secretary of The Gaslight and Coke Company, the amal- "gamation of seven out of nine of the Gas Companies for- "merly supplying the north side of the Thames, has already " resulted in a saving of £40,000 per annum, and it is esti- "mated by the same authority that this economy could be " doubled if the whole of the existing Companies, north and " south of the Thames, were united."

Water and Sanitary Notes.

IT is highly satisfactory to see that the health of London continues to improve, and that nothing is wanted on the part of the Water Companies to make the improvement permanent. The two last reports received from Drs. Frankland and Tidy show a material improvement in the condition of the Thames supplies, and point to a day when even better results may be realized. We shall be bound to hear a good deal about the Metropolitan Water Supply, for the Council of that busy body, the Society of Arts, have resolved to hold a conference, to commence on the 24th inst. It will continue three or four days, if not longer, and, considering that Metropolitan water affairs only are to be discussed, we think the time laid out is ample. But then we remember that the chief speakers at the Society of Arts are verbose to a degree. Let Mr. Edwin Chadwick, C.B., for example, once get on his legs, and nobody knows when he will resume his seat. In fact, most of the speakers at the Society of Arts seem impressed with but one idea—that they must indulge in a certain amount of talk before they are deemed worthy of notice. What will the conference end in? We have a strong suspicion that when it is over, Metropolitan water affairs will remain in the same condition as now. When the several speakers have aired their oratory, and a few votes have been taken, we shall find ourselves in the position indicated when the sergeant-major says, "As you were."

A gentleman occupying a high position in one of the London Water Companies lately told us, in respect to the alleged increase in the profits of the Companies through the operation of the quinquennial revaluations, that if the matter were thoroughly looked into it would be found that the increased rates demanded of the Companies by the Vestries would almost, if not quite balance the advances they actually made on existing water-rates. "A Water " Shareholder," writing to *The Times* last week, to some extent bears out this statement, and contends that the Com-

panies might just as fairly ask that the rateable value of their property should not be increased, as that they should be debarred from advancing their rates. He states that the Companies in 1878, according to the last published accounts, paid rates and taxes (irrespective of income-tax) amounting to £85,867; while the present dividend on the ordinary share capital is £773,000. So that the parishes take 11·1 per cent. of the Shareholders profit. He concludes his letter by saying: "Not content with this, I am informed that in the "quinquennial valuation being made this year some parishes "are seeking to raise the Companies rateable value by at least "fifty per cent."

That the Water Committee of the Liverpool Town Council —or rather, we should now say, "City Council," in view of the recent creation of a bishopric of Liverpool—intend pushing on during the present session of Parliament with their Bill for obtaining a supply of water from the Severn watershed, is evidenced by an answer given to a question asked at the meeting of the Corporation last week. The Town Clerk stated that a contract had been entered into for the purchase of an estate for £60,000. Of course, this has been done provisionally, subject to the passing of the Bill, which is every day getting more assured. The opposition to the scheme is considerably reduced to what it was. The details wisely given by the Corporation officials to interested persons have done much to allay the antagonistic feeling with which, in many quarters, the proposal to appropriate the River Vyrnwy was at first regarded. A discussion on the question took place at the Worcester Town Council last Tuesday, in the course of which it was stated by the Chairman of the Special Water Committee that they had good reason to anticipate a satisfactory conclusion to their negotiations for an amicable settlement of the objections entertained to the scheme on behalf of the town. As some of the principal opponents are thus to be got rid of, there is a prospect of a not very protracted fight when the Bill goes into committee.

The arbitration recently held, to determine the question as to the mud-banks alleged by the Conservators of the Thames to have been formed in the river by the discharge of sewage from the Metropolitan Board of Works pumping-station at Crossness, will be fruitful in costs, which will all have to be met by the ratepayers, either directly or indirectly. The twenty-five days the inquiry lasted were occupied by counsel and witnesses of the highest eminence, whose fees and expenses will amount to a good round sum in the total. The first indication—and that a very faint one indeed of the ultimate cost—is that at the meeting of the Metropolitan Board last Friday, the Works and General Purposes Committee's report recommended that a cheque for £1732 10s. be drawn, "being one moiety of the "Umpire's and Arbitrators charges in the recent arbitration "between the Board and the Thames Conservators."

Death of Mr. J. Shipton, of Chesterfield.—We regret to have to announce the death, on the 26th ult., of Mr. J. Shipton, of the firm of Shipton and Hallewell, Solicitors to the Chesterfield Water and Gas Company. The deceased gentleman was admitted as a solicitor about the year 1839, and commenced practice at Stroud, in Gloucestershire. In 1844 he went to Chesterfield, and entered the office of Mr. Charge, who was at that time Clerk of the Peace, and on whose death in 1849 he succeeded to the business. About the year 1850 he was joined by Mr. Hallewell, and since then the business has been conducted by these two gentlemen, who have acted as Solicitors to the Water and Gas Company from 1854. The firm are Clerks to the County Magistrates, as well as to a number of Turnpike Trusts, and their private practice is said to be unequalled in Chesterfield for extent. Mr. Shipton was several times returned as a Member of the Chesterfield Town Council, and in 1859 filled the civic chair, to which he was re-elected in the following year. The deceased gentleman's funeral took place on the 29th ult., when all the customary tokens of respect were shown by the principal private residents and tradespeople in Chesterfield; while at the gas-works the Manager (Mr. C. E. Jones) ordered business to be entirely suspended during the ceremony.

Stockton and Middlesbrough Water Supply.—A special meeting of the Stockton and Middlesbrough Corporations Joint Water Board was held on Monday, the 26th ult., when the Chairman (Mr. T. H. Bell) explained that the Local Government Board had granted the Provisional Order applied for by the Water Board, and he had therefore called the meeting to consider whether it was desirable to increase the water supply. Mr. H. G. Faber having read the Order, Mr. E. Williams moved —"That the Provisional Order having been presumably obtained, Mr. Mansergh be requested to consider the whole matter and the position of the Board, and advise the Board how they can best supply the district, it being the opinion of the Board that 70 million gallons per week will be a sufficient supply for several years to come." Mr. Dunning seconded the motion. Mr. Bulmer said he did not see any probability of more water being required than could at present be supplied. He was opposed to spending £130,000 in constructing a compensation reservoir, and taking £5000 a year out of the rates, in the probability that a demand for more water might spring up. The Chairman suggested that no action be taken till the Provisional Order was obtained. In 1872 the maximum quantity of water (6 million gallons) was, he said, pumped on one or two occasions, but since then it had never been reached, and until lately the quantity consumed had declined. The increase in the price of iron brought an increased consumption of water. Iron was again down in price, and, if it remained so, no increase in the water supply would be required. Upon the motion being put, three members voted for, and four against it. The motion was therefore lost.

EFFLUVIUM NUISANCES.

Second Article.

In Dr. Ballard's report to the Local Government Board on effluvium nuisances, he devotes much space to the consideration of offensive emanations arising from the various processes concerned in the manufacture of gas, in the preparation of certain substances made use of in gas-works, and in the disposal of some of the residual products formed therein. Dr. Ballard appears to have taken especial pains to render this division of his inquiry as complete as possible, in the several points of investigation, description, and suggestion, and in so doing he trod what was to him familiar ground; for, as he informs us, he was concerned in an inquiry instituted by the newly-formed Association of Medical Officers of Health, of which he was a member, so long ago as 1857. This early investigation, which had as its principal object the determination of the nature and extent of the influence of the effluvia from gas-works upon the health of the community, had in that respect an aim identical with that pursued on a broader basis in the present inquiry, and eventuated, like the one under notice, in a confession of inability to discover evidence of cause or effect of the nature sought.

In the present instance, Dr. Ballard gives a detailed account of the process of gas-making, as gathered during visits which he paid to thirty different gas-works in London and the provinces. Commencing with the destructive distillation of coal in the retort, illustrating his description by a drawing of a setting of retorts as erected at the Vauxhall station of the late Phœnix Gas Company, he minutely describes all the fittings used in connection with such structures, from the ash-pan to the hydraulic main, not forgetting to mention and illustrate the peculiar arrangement in use at the Fulham works of the late Imperial Company, for supplementing the latter apparatus with a dry main at will. The mode of charging and discharging the retorts is then fully described, particular notice being taken of the operations of quenching the discharged coke with water, and clearing the ascension-pipes and mouthpieces of partially carbonized tarry matters. Proceeding to the next process, of charging the retorts with fresh coal, the difference between the modes of charging with scoop or shovel is commented on, with a result, of course, in favour of the former, special mention, moreover, being made of the advantage possessed by small scoops, filled, say, thrice for a large retort, over heavier scoops which would need only to be filled twice to contain an equal quantity. Backing up the charge is next described, and Dr. Ballard notes that the whole operation of charging retorts with three scoops full, backing up, and securing the lid, can be, and frequently is done by smart and experienced stokers in 35 seconds. This is, of course, good work—less experienced men would take longer; but shovel work is longest of all, and takes a full half minute longer than putting in the same charge with a scoop. Machine stoking does not appear to have entered much into Dr. Ballard's experience, as he does not mention any other examples than that of Dublin, where the Manager informed him that it had broken down, and Manchester, where the hydraulic stoker (Foulis's system) was said to work more expeditiously than hand labour; but of this no comparative evidence is afforded.

Before we follow Dr. Ballard in his subsequent description of the purification of gas, it will be best to take into consideration his remarks on the nuisance which may arise from the processes already described, and his suggestions respecting its mitigation or avoidance. As he says, both in the process of charging the retorts and of discharging them, more or less smoke escapes into the retort-house, and finds an exit from it by the various openings in the walls and roof. Much steam, of a more or less offensive kind, is given off when the coke is quenched. The process of discharging and re-charging goes on at orderly intervals throughout the day and night.

First, as to the smoke and offensive vapours from the retort-house, Dr. Ballard does not take much notice of the issue from the chimney-stack, which, as he says, is comparatively of no moment, especially where coke is used for fuel. The nuisance is from the smoke, &c., that escapes at a lower level from the openings in the walls and in the roof of the retort-house, and which, with some exaggeration, he describes as commonly beclouding the entire neighbourhood of the works. Secondly, as to smoke, &c., issuing during the discharging of the retorts, he admits that a charge thoroughly coked gives off, under the most favourable conditions, no smoke worth speaking of while it is being drawn; but as it sometimes happens that the charge has not become thoroughly coked when drawn, some parts at least are apt to be less perfectly distilled—or, as it would be called in technical language, burnt off—than others, and this is especially likely to happen to that part of the charge which lies nearest to the mouthpiece. Portions of the charge thus imperfectly carbonized give off smoke on being drawn. Or the choking of the ascension-pipe may give rise to an issue of smoky flame from the retort when the lid is removed. Concerning this latter occurrence, Dr. Ballard merely quotes the opinion of Mr. Wright, of the Bromley works, to the effect that it is less frequent when the use of the hydraulic dip is dispensed with, and makes no reference to the debateability of the general question, of which gas managers have so much experience. Thirdly, as Dr. Ballard says, during distillation a deposit of tarry and carbonaceous matters, partly dust from the charge, always accumulates in the mouthpiece, the comparatively low temperature of which favours the condensation of the former in this situation. When a retort is opened for drawing, such matter is found not only lining the lid, but lying in little heaps on the bottom or sides of the mouthpiece, and hanging from the roof of it. This accumulation is often added to by the stoker clearing the ascension-pipe before the charge is drawn. When the incandescent coke, as it is being drawn, passes over this tarry matter, it ignites it, and causes the evolution of large

volumes of offensive smoke. Few things produce more smoke in burning than tarry matters. It is the commencement of the "draw" which thus creates smoke, the succeeding portion seldom giving off any, since the surface of the mouthpiece has generally been scraped clean by what has gone before. The lower the temperature at which the coal has been carbonized, the more deposit there is in the mouthpiece, and consequently the more risk of smoke in drawing.

Concerning the issue of smoke during charging, which is the result of the first contact of the coal with the heated interior surface of the retort, when the coal begins to distil at a low temperature and the gases evolved, being rich in carbon, burn with much smoke, Dr. Ballard, of course, makes the quantity of smoke produced depend upon the time occupied in charging. He, however, states generally that the first evolution of smoke occurs about 12 seconds after the first scoopful has been introduced, without noticing the difference which might be due to the temperature of the retort. Then as to the quenching of the coke, which gives rise to a burst of watery vapour, mingling with or superseding the smoke that issues from the first portion of the drawn charge, Dr. Ballard states that this steam is more or less charged with sulphuretted hydrogen, due to the decomposition by the water of the sulphide of iron left in the coke after distillation. Coal contains a varying proportion of sulphur, the mean of eight varieties of English caking coal (such as is commonly used in gas-making) giving, according to Dr. Percy, 0·86 per cent. of sulphur, in the form of a persulphide of iron, only half of which sulphur passes off in the process of distillation. Highly sulphurous coals are avoided by gas-makers, on account of the increased purification which gas made from them requires; but more or less sulphur is scarcely avoidable, although in some gas-works Dr. Ballard says that he could detect but little odour of sulphuretted hydrogen in the vapour from the coke.

Having thus dealt with the principal causes of offence arising from the retort-house, Dr. Ballard mentions, confessedly as a small matter, the possible nuisance arising from the leakage of tarry and gaseous matters from imperfectly closed retort-lids, which, we should have thought, must, in general, be a very small matter indeed, and one which would be considered a much greater evil by any smart carbonizing foreman, for obvious reasons, than by any disinterested official Inspector. Dr. Ballard, however, deems it of sufficient importance to necessitate the drawing of a comparison between luted and Morton's patent lids for preventing leakage, though without coming to any final preference for either system.

Proceeding now to the remedies for the preceding nuisances, which, as Dr. Ballard says, may almost be deduced from the description of their nature and origin already given, he makes the following suggestions. First, the smoke produced during the drawing of the coke may be reduced to a minimum by distributing the charge of coal in such a way that its conversion into coke shall be equable throughout its bulk, which is, of course, a *desideratum* for other reasons, as gas managers do not require to be told; by careful and effectual "backing up," the coal being pushed well back into the retort; by keeping the ascension-pipe clear, which should be looked to after the charge is drawn; by careful scraping and cleansing of the mouthpiece from tarry deposits, before the charge is drawn, the matter so removed being taken away altogether, or thrown on the coal to be used in a future charge, and not left where the coke may fall in it; and, lastly, by quenching the first portion of the drawn coke immediately after it falls, and not, as sometimes happens, after the charge is half or three parts drawn.

The smoke produced in charging is lessened by the rapidity of the process. Scoop charging is, therefore, preferable to shovel charging, and Dr. Ballard recommends the use of several scoops—as many, in fact, as the retort is required to take, which might be filled beforehand, and laid ready to be run in one after another. Dr. Ballard mentions the occasional throwing in of a shovelful of coal after the scoops, to put a greater thickness of coal over a thin part of the retort, the time necessary for which may make all the difference between smoke and little or no smoke. The remedy, as he remarks, is a new retort.

The nuisance from sulphurous vapour given off in quenching the coke is one for which the use of lime mixed with the quenching water has been suggested, but, as Dr. Ballard says, without having been practically adopted anywhere, as it would impair the appearance of the coke, and damage its sale, and moreover its efficacy for the purpose intended is more than doubtful. The occurrence of this kind of nuisance would, however, betray the existence of such an amount of sulphur in the coal, that its use would probably be given up on the grounds previously indicated.

It will be seen that a due observance on all occasions of the above regulative conditions would imply nothing short of perfection in the construction, management, and working of retorts; and although it is a regrettable fact that the highest possible standard in these matters is neither understood nor enforced in every gas-works in the kingdom, yet there are many places where great attention and skill are devoted to compassing these same ends, which are dwelt upon with such emphasis by Dr. Ballard; and even there we fear that their complete realization is regarded as something to be dreamt of rather than attained. Nuisance from the retort-house is but another name for loss of gas, or careless waste of money in many different ways, and a good gas manager does not need an official reminder of that fact. Still, some smoke, and a considerable quantity of steam, must always arise from the operation of distilling coal and cooling the residual coke, and therefore the best provision should be made for their dispersion into the atmosphere with as little annoyance to the surrounding population as the circumstances of the case permit. To this end nothing more can be done than attending to the design of the retort-house itself, so that smoke and steam may only be discharged at considerable elevation through the roof. Free ventilation such as this would imply would also be a great boon to those who are employed in the retort-house, and this fact is practically recognized in the spacious and airy structures which are now generally replacing the cramped and reeking black-holes in which, even in important establishments, retorts and stokers used to be packed, without much reference to the comfort either of the suffering humanity within or without their walls.

In concluding this part of our notice of Dr. Ballard's labours, it is pleasing, therefore, to note that, in his capacity as a Medical Officer of Health, his recommendations are in strict accordance with the ascertained interests of both employer and employed, and that modern progress in this particular direction, starting from a somewhat different base, and impelled by independent motives, bids fair to reach the same goal as that to which his own aspirations are directed.

THE LONDON WATER SUPPLY.*

The plan of this little work is an amplification of that which appears as an addendum to the Author's previous treatise on "The Rating of Gas and Water Works."† Mr. J. Quick considers it desirable that the Water Supply of the Metropolis should be in the hands of a Public Authority; but he likewise shows that great improvement might have been effected had the Companies amalgamated their undertakings. In discussing the policy of amalgamation, the Author refers to the part taken by the JOURNAL in urging the London Water Companies to adopt this principle, and he regrets that our appeals should have been made in vain. The outlay of two millions and a quarter, in pursuance of the Act of 1871, might have been "very considerably reduced" under a system of united instead of separate works.

Much is being said in certain quarters as to the possibility of introducing the principle of competition into the working of the Metropolitan Water Supply. It is contended by some of the opponents of Sir R. Cross's Water Bill that the London Water Companies "have no monopoly," and that this should be taken into account in estimating the value of their undertakings. Mr. J. Quick deals very lucidly with this part of the question, and quotes the Appendix to the Report of the Sanitary Commissioners of 1845, where an account is given of the competition which once existed between the three South London Water Companies. Competition has been tried—or, rather, it has been permitted—and the results were so unsatisfactory that Parliament has legislated on the assumption that competition is henceforth out of the question. The extent to which Parliament is willing to go in the direction of authorizing a competing supply is shown by the Public Health Act of 1875, where it is set forth with regard to the water supply in the provinces that "it shall not be lawful for the Local Authority to construct water-works within such limits [*i.e.*, the limits of supply of any Water Company empowered by Act of Parliament], if and so long as any such Company are able and willing to supply water proper and sufficient for all reasonable purposes for which it is required by the Local Authority;" and any difference on this point is to be settled by arbitration. As Mr. J. Quick observes, this enactment practically affords protection against competition to all Water Companies established under Act of Parliament. But the case of the London Water Companies is still stronger, the Metropolis having no share in the privileges granted to the provincial Local Authorities by the Act just cited. As concerning competition by private enterprise, that was unequivocally condemned by a Select Committee of the House of Commons in 1821, and by the Sanitary Commissioners in 1845.

It is too late in the day to argue that competition is permissible in the case of the London Water Supply. The Companies have been encouraged to expend money, and have been called upon to make certain costly arrangements, on the implied basis of what must be termed a regulated monopoly. So long as the Companies do their best to fulfil their responsibilities, they are obviously in a position to claim protection. But the utter uselessness of competition is shown by past experience, and the doctrine has been laid down "that the principle of competition cannot with advantage be applied to the operations of the London Water Companies." Such was the view of the Sanitary Commissioners who reported in 1845, and of the Select Committee 24 years before. The fact that at the present time there is no single instance to be found throughout the United Kingdom of competing Water Companies, shows the unreasonableness of expecting or demanding such a state of things in the Metropolis. Where competition has been attempted, amalgamation has resulted, accompanied by "the creation of a double capital entitled to statutory dividends," to the consequent damage of the consumers.

Mr. J. Quick repeats in his present work a position which he maintained in his former *brochure*, that "it is not the business of the purchasing authority to inquire into whether the sellers would gain or lose by the transfer, but to see that they, as purchasers, will get value, present and prospective, for the money of those whom they represent." Such was the principle on which the Metropolitan Board acquired the toll bridges over the Thames. The terms of purchase were settled by reference to the income-earning power of the bridges, irrespective of their original cost. Had these bridges been highly profitable undertakings, it is possible that the Metropolitan Board would have urged the adoption of a different principle; but we cannot suppose that the argument would have been of any avail. The fact that the water supply yields a large and

* "The Water Supply of the Metropolis, and the Proposed Transfer of the London Water Companies to a Public Authority." By Joseph Quick, jun., M. Inst. C.E. London: E. and F. N. Spon. 1880.

† See *ante*, p. 438.

growing profit is to be taken as the basis of value, just as surely as the earning power would furnish the basis in the case of a losing enterprise. Mr. J. Quick goes into the reckoning to show that the terms of purchase laid down in the Bill of Sir Richard Cross are favourable to the inhabitants of the Metropolis, although beneficial to the Water Companies. We may, indeed, observe that according to the doctrine espoused by political economists, a trading transaction is one in which both parties are benefited. It is in this respect that trading differs from spoliation on the one hand, and gambling on the other.

Concerning the mode in which Mr. J. Quick has handled the entire subject of the Water Supply of the Metropolis, we can only do this gentleman the justice to say that he has put the question very clearly, and discussed it very impartially. The book, which is of no great size or cost, ought to be in the hands of every one who wishes to know what can properly be said in defence of a scheme of purchase such as that brought forward by the late Government. There is also much useful information in the book as to the history of the Metropolitan Water Question, rendering it valuable to all parties, whatever their particular views may be.

Communicated Article.

EFFECT OF TEMPERATURE IN THE GAS AND AIR SUPPLY UPON THE ILLUMINATING POWER OF GAS-FLAMES.

By Mr. R. H. Patterson, F.S.S.

The recent experiments of Herr F. Siemens (reported in the Journal of the 13th of January last) bid fair to revive and give practical interest to some comparatively old questions connected with the illuminating properties of coal gas. He has constructed gas-burners, or rather lamps, in which both the air and the gas are heated; and although he does not state the results precisely, and apparently has not yet determined them with the accuracy which he desires, his report unequivocally shows that the employment of the said apparatus gives a vast increase in the illuminating power obtained from the gas.

I shall describe Herr Siemens's experiments in the sequel, but shall first treat of the subject generally. The question is two-fold—viz., what is the effect of a higher or lower temperature in the air supply to gas-flames as regards their luminosity? and what is the effect of a higher or lower temperature of the gas itself, as supplied to the burner, or rather at the point of ignition?

There is a very important difference between these two cases. In both, a rise of temperature involves, and is necessarily accompanied by an expansion or dilatation of the substance, whether gas or air. Accordingly, a larger volume of heated or rarified air is required to supply any given quantity of oxygen necessary to produce combustion of the ignited gas; and, *cæteris paribus*, a larger volume of heated gas passing through the burner within a given time is requisite to supply any given quantity of light-giving substance. But the point of difference is, that all the constituents of coal gas are combustible in a very high degree, whereas nearly four-fifths of the air, or atmosphere, consists of nitrogen, which is absolutely incombustible. Accordingly, the effects of heating the air supplied to flames must be considerably different from those attending the heating of the gas itself. The difference is exactly similar to heating the coal in a furnace, and heating the air supply to the furnace, or to the ignited coal.

The value of the "hot blast" in producing an intense combustion in furnaces is well known; but as yet little attention has been given to the heating of fuel in furnaces, which would be a parallel to heating coal gas previous to its ignition. If a furnace be fed by cold air, the four-fifths of the air which consists of nitrogen will all be heated to the same temperature as the furnace, and thereby must absorb a corresponding portion of the furnace heat which otherwise would go to intensify the combustion. Therefore the advantage to be gained by heating the air supply is obvious; for the higher the air is heated before admission into the furnace, the less will be the amount of heat absorbed by the incombustible nitrogen. The same is true of the oxygen; but I believe that almost, if not absolutely, the whole advantage of heating the air supply arises in connection with the incombustible part of it. If it is borne in mind how immensely the mere act of ignition (that is, the mere chemical combining of the oxygen with the fuel) at once raises the temperature of a highly combustible body—for example, raising coal gas from the ordinary temperature of, say, 70° Fahr. to about 5000° Fahr.—it is obvious a prior heating of the oxygen to any lesser extent can have little or no effect. On the other hand, a prior heating of the nitrogen to the extent of merely 300° or 400° Fahr. will lessen the absorption of heat from the furnace to an exactly equal, and therefore very considerable amount. Hence, as it seems to me, the advantage of the hot blast is almost or entirely owing to the fact that the air contains such a preponderance of incombustible matter. In other words, if this view be correct, there could be no appreciable advantage at all from the hot blast, or from heating the air, if the air consisted wholly of combustible or combustion-supporting gases, like oxygen.

Now, this is just the case with coal gas. By far the larger part of coal gas consists of gases which give little or no light; but all of it is combustible, and in the highest degree. Accordingly, when ignited, every portion of the gas contributes to the intensity of combustion, adding to the temperature of the flame. Thus, then, there is obviously a great difference to be expected between the result of heating the air supply to a gas-flame, and of heating the gas itself; and, according to the view above expressed, a certain gain in illuminating power (owing to higher intensity of combustion) may, *à priori*, be expected from heating the air supply to a gas-flame (or any other), but no gain at all, or no appreciable gain, from heating the gas itself. As already said, when ignited, coal gas at once acquires a temperature of about 5000° Fahr., and what effect is to be expected from previously heating it to the extent of 500° or 600° Fahr.?

Heating the Air Supply.

It was the Rev. Mr. Bowditch (doubtless as a wise inference from the "hot blast") who first made experiments in heating the air supply to gas-flames with a view to increase their illuminating power. In doing so, he resolved to make the gas-flame heat its own air supply; and this he accomplished by the simple means of putting an extra chimney around the Argand. His apparatus was a common Argand and chimney, with another and larger chimney placed around it; the arrangement of parts being such that the whole air supply to the flame descended through the outer chimney, and then entered at the bottom of the inner and ordinary chimney. The heat radiated from the flame proved sufficient (it is stated) to heat the air between the two chimneys to a temperature of from 500° to 600° Fahr. Dr. Letheby, in 1866, stated that the result of heating the air supply in this manner was to increase the illuminating power about 67 per cent.; and "for equal lights," he said, "it is found that there is a saving of 46 per cent. of gas." He gave the following experiments, made with cannel gas—quality not stated, but probably of 24-candle power, like the cannel gas then made in London:—

Illuminating Power, in Sperm Candles, burning 120 *grains per Hour.*

Consumption of Gas per Hour.	Ordinary Argand.	Ditto with Extra Chimney.
2·2 cubic feet.	—	13·0
2·6 ,,	—	15·5
3·3 ,,	13·0	21·7
3·7 ,,	15·5	—

These experiments are not so complete as is desirable, for only in one of them (the third) can a direct comparison be made. From such experiments alone, I do not think it safe to accept Dr. Letheby's 67 per cent. as a normal result. Nevertheless, it is manifest that the effects of heating the air supply by means of the double chimney were highly advantageous to the illuminating power of the gas.

It is important to observe, however, that Dr. Letheby stated that "he did not find a like increase of illuminating power with *common* gas." Nor does he say that he found any increase at all with common gas, although obviously he had tried the apparatus upon it. It may be presumed that the experiments with cannel gas were made by himself, but his language, unfortunately, leaves it doubtful whether all his statements are from his own experience, or whether part of them are taken at second hand.

Effects of Heat in Rarefying the Air.

Nature is very simple in her principles, but exceedingly complex and conflicting in her phenomena. When *all* the facts of a case are understood, every question becomes simple. But while experimenters or other investigators are still groping, they constantly meet with phenomena so conflicting that they feel at a loss to find an outlet from the maze. Now, in this question of heating the air supply to gas-flames (or any other) there is one conflicting phenomenon which deserves to be noticed. In proportion as air is heated it becomes rarefied; and, as is now well known, the more rarefied the air, the less light is obtainable from a flame. This fact was first observed in the course of experiments made with flames at a high altitude. Humboldt, when journeying in the Andes, had noticed that the flames of a fire did not present their ordinary appearance, but "dispersed and leapt about;" no doubt because, owing to the thinness or specific lightness of the air at these altitudes, there was less difference than usual between the heated mass of the flames and the surrounding atmosphere; and also, perhaps, because the temperature of the flame itself (and consequently its ascending power) was less than usual; and hence the flames did not rise or shoot up in the ordinary manner.

The effect of the thinness of the air in high altitudes upon the illuminating power of flames was first observed by Dr. Frankland and Professor Tyndall in the autumn of 1859, when they were making experiments on the combustion of candles at the top of Mont Blanc. They noticed that although the candles burned at the same rate as they did in the Valley of Chamounix, yet the flames were blue, and large and feeble. Dr. Frankland was so much struck with the phenomenon that he afterwards made it the subject of careful investigation; and he found that a gas-flame, like that of a candle, gave less and less light as the air in which it was burning was rarefied. His results, as stated by Dr. Letheby in 1866, "show that the loss of light is about 5·1 per cent. for every inch of diminished mercurial pressure up to a rarefaction of 14 inches. If, for example, the light of a flame be equal to 100 at 30 inches of the barometer, it is but 94·9 at 29 inches, and 89·8 at 28 inches; and so on up to 14 inches, when it is only 18·4 per cent. of the original light. Fortunately, in our photometrical inquiries the loss of light is equally great with the gas and the standard, or the variations of atmospheric pressure from day to day, or even from hour to hour, would show a marked difference in the value of the light. As it is, a variation of 3 inches of the barometer must cause a difference of more than 15 per cent.; and it is not improbable that this may have something to do with visible variations in the light of the public lamps. Certain it is that the same gas in places at different altitudes will have very different values. The gas, for example, which in London has the value of 100, would be but 91 at Munich, and only 61·5 in Mexico. Indeed, the difference would be greater than this, for not only is the light actually less for equal consumptions, but as the volume of the gas

expands with the rarefaction and temperature, the real value of the same quantity of gas as measured by the meter in Mexico would be only 46·2. Even in London the difference in the value of the light when the barometer is 31, as compared with what it is at 28, is fully 25 per cent."

Now, what is the import of these facts in the present inquiry? If you heat the air, you rarefy it, and therefore diminish the illuminating power of the flame which burns in it. Therefore, one effect of heating the air supply to a flame must be detrimental. But, manifestly, from the experiments with the double-chimneyed Argand, this detrimental effect must be much more than compensated by the other effect—viz., the hotness of the air in promoting intensity of combustion, by lessening the cooling influence of the surrounding air upon the flame. The former of these effects, however—viz., the detrimental one—has not hitherto been considered; and as the experiments upon heating the air supply are as yet inadequate for the ascertainment of trustworthy results, it seems desirable that further experiments of this kind—with the double-chimneyed Argand or otherwise—should be made.

Heating the Gas.

Next, as to heating the gas itself. Upon this point two opposite opinions used to exist; and possibly they exist still. The Leslie burner was constructed expressly with the object of heating the gas before it issued from the orifices. It was an Argand, with separate small metal tubes for each of the gas streams, or jets, which together compose the circular flame of the Argand. Whether this arrangement really effects its proposed purpose—in other words, whether the gas is in this way more heated than it is in the gas chamber of the ordinary Argand—appears to me very doubtful; because, although a larger surface of the gas is undoubtedly exposed to the heated metal of the small tubes (which acquire heat by convection from the gas-flame) than occurs in the hollow chamber of the Argand, it is equally true that these small separate tubes present in turn a larger surface to the cooling action of the atmosphere, whereby heat cannot accumulate or remain in them to the same extent as in the body of the Argand. Be this as it may, the Leslie burner certainly did not evolve so much light from the gas as the Sugg-Letheby, and proved still more inferior to the standard Argand. If I correctly remember the results of experiments which I made with the Leslie burner in 1868-69, its light, as compared with the Sugg-Letheby, was as 88 to 100. This result, however, was doubtless owing in part to other causes than the heating of the gas. The important effect of the structure of a burner upon the light obtained from it is well known, and of course it is possible that the heating of the gas made the Leslie burner better than it would otherwise be—or it might have made it worse—or, just as likely, had no effect at all.

The other view of the matter was, that the gas ought to be kept cool, and that the cooler the gas as it issued from the burner, the greater was the amount of light obtainable from it. This used to be Mr. Sugg's opinion; and although he had at first employed steatite for the rims of his Argands, simply because it was an incorrodible substance, and thereby preserved unimpaired the shape and size of the orifices of the burners, he soon afterwards came to employ this material, because, owing to its non-conducting property, it became but little heated by the gas-flame, so that the gas within the burner was kept as cool as possible.

No exact information upon such points had then been acquired. But there was one circumstance which was strongly in favour of Mr. Sugg's opinion. I find it stated (but without the experimenter or observer being named) that it had been observed that when the gas was heated the flame declined in illuminating power. Nevertheless this circumstance was seen to be of little or no account in determining the question; for the decrease of the light was attributed to the narrowing of the orifices of the burner owing to the expansion of the heated metal, whereby less gas issued from the burner.

Effects of Heat in Rarefying the Gas.

Another cause, however, may have been that when the gas becomes heated it considerably expands; so that, even if the same *volume* of gas continued to issue from the orifices, this volume would have less weight, and would contain a less quantity of illuminating substance. A high authority has said that to heat gas is equivalent to "diluting" it. But this is wrong; there is no dilution, only dilation,—the gas remaining pure, but occupying more space; so that if it passed through the burner at the same rate (*i.e.*, in the same volume per hour) as before, the gas would be thinner, and would necessarily contain less illuminating substance. In so far as this actually occurred, it would *pro tanto* account for the observed diminution in the light of the gas-flame.

Further, however, this expansion of the gas would tend to impel the gas at a quicker rate through the orifices of the burner. The pressure behind remaining the same, while the gas within the burner increased in bulk, the tendency would be for the gas to be driven through the orifices more rapidly than before. Now this would affect the illuminating power exactly as an increase of pressure does. In fact, the result of increased pressure, and the cause of its damaging effect upon the illuminating power of the gas, is the increased velocity of issue; just as must, to some extent, occur when the gas is heated within the burner.

Thus, then, if the effect of heating the gas be made in such a manner that a less *weight* of gas issues from the burner per minute (owing to dilation of the gas, or contraction of the orifices of the burner, or both) then, obviously, the gas will contain less illuminating substance; and, therefore, a decrease of the illuminating power may be owing entirely to this fact, and not be an effect of the gas being at a higher temperature than usual at the moment of ignition. On the other hand, if, in consequence of its expansion, the gas passes so much more rapidly through the orifices as to compensate for its dilation—in other words, if its expansion be one-fifth, while its velocity is increased one-fifth—then the same weight or amount of illuminating substance will issue from the burner per minute as before; but the effect upon the illuminating power will be the same as if the pressure had been increased one-fifth, or 20 per cent.—and this effect in the case of an Argand would certainly be injurious. This, whether the result of heating the gas be to send through the burner the same volume as before, but of thinner gas; or whether the result be that a proportionately larger quantity of this thin gas is passed through, but under greater pressure or with greater velocity, either of these two results will *per se* be detrimental to the illuminating power of the flame.

Experiments at Munich.

In 1870 a series of experiments, as to the effect upon its illuminating power of heating coal gas, were made in the laboratory of the University of Munich, which may be summarized as follows:—The normal temperature of gas was taken to be 64½° Fahr., and the illuminating power of the gas at this temperature, as the standard, was represented as 100. The burner was attached to a U-tube, which was immersed alternately in a freezing mixture and in a liquid at high temperature. When the U-tube was immersed in boiling water (temperature 212°) the illuminating power of the gas-flame rose from 100 to 104; and when melted paraffin was substituted for the boiling water, and the temperature of the gas thereby increased to 288° Fahr., the illuminating power of the flame rose to 118—showing an increase of 18 per cent. in the illuminating power of the gas as the result of the rise of temperature.

A report of these experiments reached this country when I was engaged in preparing the Gas Referees report "On the Construction of Gas-Burners with reference to the Principles of Gas Illumination," issued in June, 1871, and I resolved to make some experiments on the subject. These I carried out with the co-operation of the late Mr. W. Thompson, who was Chemical Assistant to the Referees, and whose premature death I deeply regretted, both from personal regard, and because his abilities, if adequately applied, would have given him no mean place in the ranks of the chemical profession.

In order to test the correctness of the results obtained at Munich, and generally to ascertain for myself what effect temperature has upon the illuminating power of gas, I made the following experiments, as narrated in the report; the temperature of the room, and consequently of the ordinary gas, being about 65°, or exactly the same as the normal temperature of the gas in the experiments at Munich:—A 12-feet coil of half-inch metal pipe was placed in a water-bath; a metal pipe 18 inches long led from the top of the coil to the burner; and midway between the coil and the burner a thermometer was inserted in the pipe in such a manner that the gas passed over the bulb. The water was then raised to the boiling point (212° Fahr.), but the thermometer in the gas only rose 1° or 2°, and remained stationary. Oil was then used instead of water, and the coil was lengthened from 12 to 56 feet; nevertheless, when the oil was raised to its boiling point (about 400° Fahr.), the thermometer in the gas only rose to about 79° Fahr. Inferring (perhaps, as will appear, too hastily) from this, that the gas in passing through the coil failed to absorb the heat from the surrounding oil, large shot were introduced into the coil of pipe, in order to conduct the heat inwards, and bring the gas at all points in contact with heated metal. Even then the thermometer hardly showed any further rise of temperature; but it was incidentally observed that the quicker the gas was sent through the pipe, the greater was the rise of the thermometer, although, of course, the gas was then for a shorter time in contact with the heated metal.

This fact seemed to show that we had been working in the wrong direction, and that the stationary position of the thermometer was not so much owing to a difficulty in heating the gas in the coil, as to the rapidity with which, after leaving the coil, the gas lost the heat so acquired. Accordingly, in the subsequent experiments, we surrounded the pipe leading from the coil with a jacket filled with boiling oil, and extending to within two inches of the point of ignition, the thermometer being again placed between the coil and the burner. The effect of this change in the apparatus was striking; the thermometer in the gas at once rising to 296° Fahr.—*i.e.*, to the highest temperature attained in the experiments made at Munich, and which, according to those experiments, produced an increase of illuminating power to the extent of 18 per cent.

Having thus obtained as high a degree of heat as was employed at Munich, we made a bye-pass from the meter to the burner, through which the cool or unheated gas might be supplied to the burner; and the apparatus was so constructed that the burner could be supplied instantaneously with cool and with heated gas alternately, so that any change of illuminating power produced by a high or a low temperature of the gas could be readily noticed. But *the heated and the cool gas gave exactly the same amount of illuminating power*. In other words, the effects of heating the gas were *nil*.

(*To be continued.*)

The Directors of the Imperial Continental Gas Association state that at the forthcoming ordinary half-yearly meeting they will (subject to the audit of the accounts) recommend a dividend of 5 per cent. for the half year ended the 31st of December last, and a bonus of 1 per cent., both free of income-tax.

Sale of Shares in the Exeter Gas Company.—On Tuesday last, Mr. R. W. Best offered for sale 1000 £10 ordinary shares in the above-named Company. They were sold in lots of ten and five shares each, the tens realizing from £120 to £122, whilst the lots of five were disposed of at from £60 to £62 each lot. The competition was brisk, and the sale was well attended.

Correspondence.

[We do not hold ourselves responsible for the opinions expressed by Correspondents.]

PUMPING GAS AT BECKTON.

SIR,—Referring to Mr. G. C. Trewby's letter in your JOURNAL of the 4th inst., we would beg to call that gentleman's attention to our tender for the works at Beckton, dated the 5th of February, 1879, and to the drawing which we sent with that tender. This drawing, if Mr. Trewby will compare it with the arrangement engraved in the JOURNAL of April 20, he will find corresponds exactly with it; and, in fact, is the same arrangement that we then submitted to him for his approval.

If Mr. Trewby will kindly also refer to our letter to him of the 3rd of February, 1879, he will find that we then advised him that we had invented an arrangement by which we had quite overcome the oscillation in the exhausters; and again, on Feb. 6, we stated: "We shall be glad to give you any information on the subject of non-fluctuating exhausters, and explain to you our system, if you would kindly give us a call, or make an appointment to see us at Beckton. *We have already supplied machinery on this improved plan, and are also making a set for your own Company at Bromley station.*"

Further, our Catalogue of 1877 was forwarded to Mr. Trewby, and his attention was personally called to fig. 314, page 14, in which a *fac simile* of the arrangement as engraved in the JOURNAL is shown and fully described.

GWYNNE AND CO.

Essex Street Works, Strand, W.C., May 4, 1880.

HIGH PRESSURE IN TRUNK MAINS.

SIR,—Permit me to ask if it would not be better to look straight at the cost of duplicate or enlarged mains for increased delivery, rather than increase the pressure by pumping. I have always found that increased pressure in gas-mains results in loss by leakage and condensation, which increase in exact proportion to pressure; while an enlargement of area has invariably repaid its own outlay in a short period.

THOMAS PROUD.

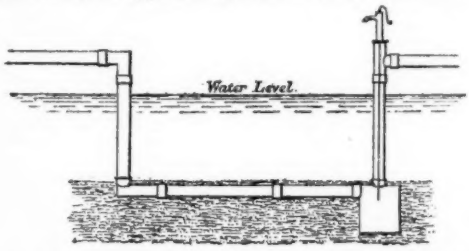
Birmingham, May 7, 1880.

CONVEYING GAS ACROSS SMALL NAVIGABLE RIVERS.

SIR,—Will you please find space in your JOURNAL for the following queries:—

I am anxious to carry a supply of gas across a river—say, a 4-inch pipe. The depth of water averages 12 feet. The sides of the river are connected with a flap bridge, which is subject to be lifted daily, to allow small vessels to pass. The sludge at the bottom of the river would secure a pipe from contact with the keels of vessels.

By carrying a pipe down one side, across the bed of the river, and up the other side, with syphon and pump fixed, as per annexed diagram,



what amount of loss by, and trouble with condensation should I have? Altogether there would be about 40 feet of pipe immersed, and the temperature would rarely be below 40° Fahr.

Would wrought or cast iron be best for the purpose? The river being subject to tidal influence is impregnated with sea water.

Would a hose across the bridge, with the necessary connections, be preferable? in which case the supply of gas would be intermittent in the daytime only.

I may state that the present consumption of gas would not warrant a holder being erected on the opposite bank of the river, though I anticipate that in future years this will be the best of all ways of getting over the difficulty.

Perhaps some of your able correspondents will enlighten me on these points, and their answers may be useful to others. I have never seen this subject propounded during the fourteen years I have been a subscriber to the JOURNAL.

D. W.

THE MANUFACTURE OF SULPHATE OF AMMONIA.

SIR,—The lamentable and sudden death of one of the chief officers of my Company has delayed my reply to Mr. Stevenson's letter of the 24th ult.

Instead of enunciating his own opinions by statements of facts or by arguments of reason, your correspondent is driven to the desperate expedient of asking questions, and ascribing dishonourable motives to myself, and imputing to the witnesses of eminence and probity called on the occasion, that their evidence was not the result of honest convictions. In justice to these gentlemen, and on their behalf, I deny the impeachment.

Mr. Stevenson's right to question me is not made apparent in his letter, and from whence his authority to criticize the mode of working of this Company is derived, he leaves your readers to conjecture. As to his first question, he will find an answer to it in the evidence that the apparatus was in perfect order, and perfect of its kind.

The second question refers to my absence from these works at midnight, and I am constrained to admit that at the time, like many other engineers and managers, I was indulging in what a great poet calls

"Tired nature's sweet restorer, balmy sleep."

I venture to hope that your correspondent was enjoying the same inestimable blessing. At no time are my works, or any other well-conducted gas or water works, at any time, day or night, left without a competent man in charge, nor without instructions written or printed.

Question 3.—I have the honour to number amongst my friends both Mr. Oliver and Mr. Taylor; but why Mr. Stevenson asks this question I am at a loss to understand, unless it be to create an impression that they were not the witnesses of truth—an inference which those who know those gentlemen would resent. The case *was* watched on behalf of one of the deceased workmen.

Question 4.—The answer to this will be found in my last letter.

It appears that Mr. Stevenson's still is "quite a different thing from the Coffey still," and he claims that the salt made by it is superior to samples from some of the largest works in the kingdom. Further information on this point should be forthcoming; but assuming it to be so, though I have never seen his salt, it does not appear to have occurred to Mr. Stevenson that his modesty might have permitted others to discover and to proclaim the fact.

CHARLES EDWIN JONES.

Gas-Works, Chesterfield, May 7, 1880.

THE BRAY LANTERN AND BURNER, AND MR. SUGG.

SIR,—Though I had intended my letter in your issue of the 20th ult. to be my final one on this subject, I feel that I must ask to be allowed to trespass again on your space, in order to deal with Mr. Sugg's last change of position in his attempt to clear himself from the charge that he has adopted my system of lighting; and as I desire to keep strict faith with yourself and your readers in everything I do in this matter, I wish to make a remark or two regarding the drawing of my first lamp patent (No. 1454 of 1879), which you inserted in your issue of April 20, and which Mr. Sugg states "was not a copy" taken from my specification, and that the alteration was made to "mislead your readers." Had I, instead of giving data for all the important facts I have stated, shielded them from your readers by such sophistry as Mr. Sugg uses, and did I constantly shift my position, as I have shown him to have done, there would then be just ground for the charge that I was attempting to "mislead your readers;" but I will show that there is not the slightest ground for that statement, and will fasten the charge on Mr. Sugg in a way he will find it difficult to get out of satisfactorily before your readers.

It is now well known that part of my lamp improvements consists in "causing a column of air (other than what is required for combustion and ventilating purposes) to flow vertically through the centre of street and other lamps. The air is made to pass up in such volume and at such a rate of speed as will steady, increase the brilliancy, and give control over the lighting power of the flame or flames submitted to its influence." The specification in my first lamp patent (No. 1454 of 1879) shows that the air for this purpose may be taken in either at the bottom or at the top, as may be desired. The sectional drawing accompanying the specification from which the sketch I sent was taken, shows the whole of the parts necessary for taking in the air either at the top or at the bottom of the lantern, and both modes are fully described in the specification. Figs. 1 and 2, in your notice of April 20 (which embody the improvements of my second lamp patent—No. 3347 of 1879), show my improved mode of taking in the air at the bottom; fig. 3 (patent No. 1454 of 1879) was, therefore, only required to illustrate the mode of taking in the air at the top. I therefore showed in that drawing only the parts necessary for carrying out my principle by taking in the air at the top, and *left out* the arrangement for taking in the air at the bottom, because the improved mode of doing so was shown in figs. 1 and 2. The parts I showed were a transcript of my patent drawing, with the exception—for clearness and brevity—that more arrows were used to show the direction of the air currents, and the letters, 46 in number, left entirely out—a plan I observe you also adopted in the complete sketch which you published. If your readers will kindly refer to your issues of April 20 and 27, they will see that my draughtsman, though he had to reduce the sketch, has scarcely departed in the slightest particular from the patent drawing. Had your readers been able to see my full specification along with the lettered drawing, as Mr. Sugg has done, they would have perceived, without the above explanation, how false is his charge that I had altered my drawing, and that I had done it to "mislead your readers."

I have now to deal with the drawing Mr. Sugg sent you, which he stated to be a copy of his "shadowless lantern, registered in 1879." In passing, I would say that in his letter in your issue of the 13th ult. he stated, in language that could not be mistaken, that this lantern was *patented* Jan. 27, 1879, thereby "misleading your readers," including yourself and myself, as in my letter of the following week I showed that there was no patent. In his last letter he shifts his ground, and says the lantern he showed at Birmingham was "registered" only, the effect of which, I may inform your readers, is to prevent any one seeing it without visiting London, and to prevent any one taking a copy without first obtaining a judge's order, or being supplied with one by Mr. Sugg. Notwithstanding this, he sends a *sketch* (not a *copy* of the registered article) which he states *is* a copy of the "shadowless lantern registered in January, 1879," and which you published. I have to ask you to publish alongside the sketch Mr. Sugg sent [see accompanying engraving, fig. 1], the *actual lantern* he registered [see fig. 2], with the description of it; and may I ask that you will also publish alongside these, fig. 3 of my lantern from your issue of the 20th ult., which shows the arrows [see fig. 3].

If Mr. Sugg's sketch be now compared with my lantern and burners, it will at once be seen that his alterations are all in the direction of my apparatus. The shape of the registered lantern is altered; the cone is placed in the top of the lantern, for diverting the incoming air down its sides; a chimney is introduced for the production of the "vertical column of air," for dealing with my flat flames in the way described in my specification; and the Argand burner, for which the registered lantern was evidently designed, is taken out. The fundamental principle carried out in my apparatus is, as I before stated, the production of a "vertical column of air," and the use of this vertical column for dealing with flat-flame burners, as before described. For the production of this vertical column I take in the air either at the top or at the bottom of the lantern. The top mode is the one shown in the accompanying drawing, and it is this that Mr. Sugg exactly copies in the

sketch of his lantern, and the words of my specification exactly describe it as follows:—

"When the upper ventilator is used for an inlet and outlet combined, a small conductor chimney is used extending towards the top of the interior cylinder, having a funnel-shaped bottom extending into the lamp. This conducts the products of combustion to the top of the interior cylinder, from whence they pass through the upper perforations and escape into the air in the direction shown by the arrows, whilst the outer air is admitted at the bottom and passes over the funnel and down the sides of the lamp."

Then Mr. Sugg produces his column of air by passing it up his chimney, while I produce it in a more efficient manner by passing it up my chimney with the conical base, and the column of air in both cases is used, in the words of my specification, to "steady, increase the brilliancy, and give control over the lighting power of the flame or flames submitted to its influence." If Mr. Sugg's specification be now looked at, it will be seen that no mention is made of a "vertical column of air," or of dealing with flat flames with same, either "singly, doubly, or in clusters;" and that the transparent object of the design is to produce a quiet atmosphere for the use of an Argand burner, for which purpose it has always been used until Mr. Sugg's Birmingham exploit. In other words, what Mr. Sugg claims, I neither claim nor use, but he transfers bodily my patented parts to his lantern, and sends the sketch, declaring it to be a copy of his registered apparatus.

I am sorry that I have still further to trouble you with the disagreeable duty of showing that Mr. Sugg has in other instances misrepresented facts. From Mr. Sugg's filed specification it will be seen there is nothing new for any one to imitate beyond the peculiar design of the lantern. Mr. Sugg, in his letter of the 27th ult., states that "Mr. Bray has adopted my lantern even to its ribs and reflectors. He has adopted my hollow-top flat-flame burners under another name," &c. None of these features are mentioned in Mr. Sugg's claims. White glass, as most of your readers will know, has been used for lamp tops for a generation. As to my having used *his* hollow-top flat-flame burners, I should like him to attempt to prove, with evidence other than his own word, that he ever had anything to do with the invention of the slit union (hollow-top) burner. Meanwhile, Mr. Sugg knows that the patent he said he took out for these burners in 1874 (No. 4227) did not mention them in any way; and he is now advertising them as patented in 1875 (without giving the number), and this statement is as baseless as the other.

As to the lamp ribs, though there is nothing claimed for them in Mr. Sugg's design, I have been at some trouble to examine for myself the ribs of his lamps, and find that they are of the ordinary T-kind, and that there is no indication in them of the improvement which I have added, and those who possess Mr. Sugg's lanterns will be able to prove this for themselves. To show this conclusively, I have had an engraving prepared of the section of the rib (fig. 7 in my second patent, No. 3347 of 1879, a copy of which I herewith send you), which I ask you to insert along with this letter. My specification states that this improved lamp rib (designed to give a maximum of strength with a minimum of light-obstructing surface) "consists of a thin strip of metal being placed edgeway up along the centre of inside of lamp ribs, *u*, and sufficiently high above the rib sides on which the panes of glass, *v*, rest to form a separating barrier between the panes, and prevent each pane encroaching on the other pane's portion of the rib."

Now, Sir, I tell you candidly that on no hypothesis can I account for Mr. Sugg's conduct in this controversy, and must leave that to be judged by your readers.

GEORGE BRAY.

Blackman Lane, Leeds, May 8, 1880.

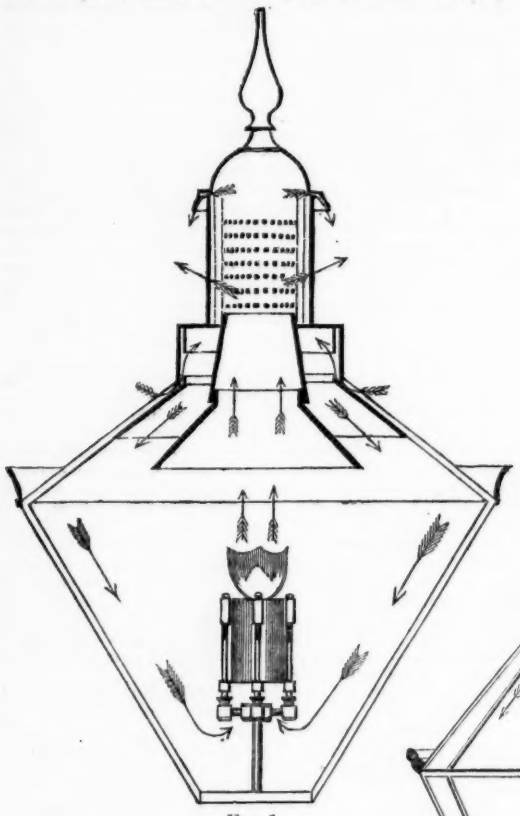


FIG. 1.

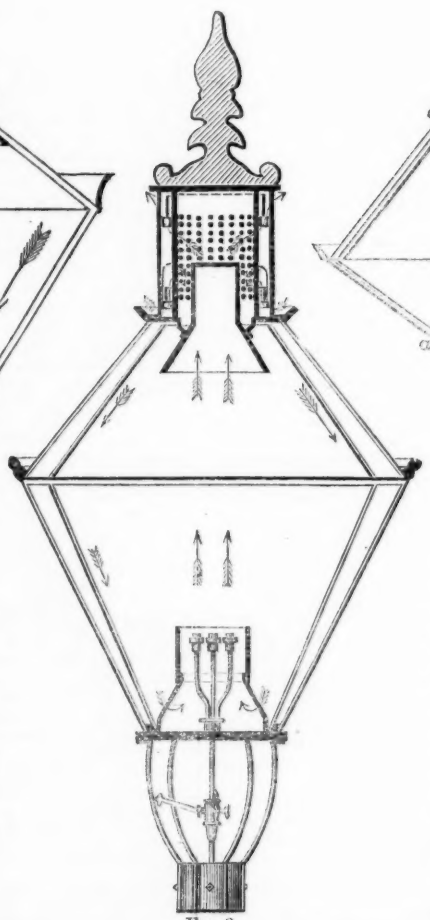


FIG. 3.

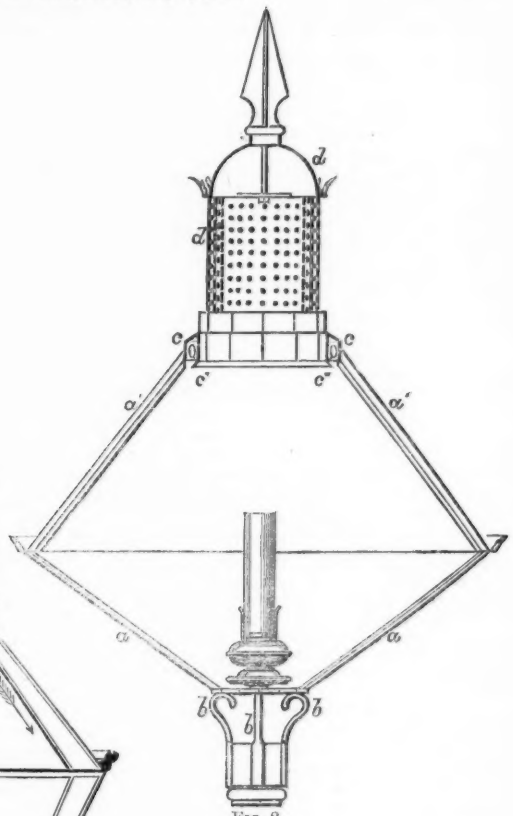


FIG. 2.

DESCRIPTION OF THE ENGRAVING, FIG. 2.

This design has reference to the production of a street-lamp which, while it is properly ventilated, shall be unaffected by gusts of wind, and shall throw little or no shadow upon the ground. The design relates solely to that portion of the lamp which may be termed the lantern. This consists of two skeleton pyramidical frames, *a a'*, joined together at their bases, and forming a chamber for the burner. The lower frame, *a*, is connected to the lamp-post by supports, *b*, and it may be open at the bottom for the supply of air to the burner. The lower frame is glazed with clear glass, and the upper one with opal glass. The upper frame terminates in a ring, *c*, which is pierced with large oval holes for the purpose of ventilation. Upon this ring is mounted a dome, *d*, the vertical walls of which are cylindrical and pierced with small holes, through which the gases of combustion escape. Within this dome are two cylindrical linings formed of pierced metal. Thus the walls of the dome may be said to consist of three concentric cylinders. The middle cylinder is so arranged that its solid parts will be opposite the holes of the other cylinders, and thus any gust of wind striking the dome can only enter by a zig-zag path. To prevent any air blowing through the openings, *c*, a curtain, *c'*, is provided which covers the openings, leaving a free space for the circulation of air. The design is new in so far as regards the shape or configuration of the parts, *a*, *a'*, *b*, *c*, and *d*.

W. S. M'G. writes: "Can some of my brother managers give me the benefit of their experience in trying to keep tight a leaky gasholder tank. The tank is brick with puddled clay behind, and has a cement bottom. We want the tank; so, if we can diminish the leakage, although it should only be a temporary cure, it will assist us considerably. Various plans have been tried and failed—one of them my predecessor tried being to pump about 6000 gallons of tar into it. I want this tar out, hence the increased leakage."

Legal Intelligence.

FENTON POLICE COURT.—Friday, April 30.
(*Before Mr.* H. C. Greenwood, *Stipendiary.*)

THE STAFFORDSHIRE POTTERIES WATER-WORKS COMPANY AND THEIR CUSTOMERS.

The Staffordshire Potteries Water-Works Company were summoned for unlawfully neglecting and refusing to furnish to Mr. Alfred Patterson, of the Eagle Vaults, Longton, a supply of water at and after the rates and in the manner mentioned and specified in the 47th section of the Staffordshire Potteries Water-Works Act, 1853.

Mr. Paine, who appeared in support of the summons, said the 47th section of the Act referred to provides that in cases of schools, manufactories, dyers, printers, brewers, inukeepers, livery stable keepers, ale-house keepers, and other persons requiring a supply of water for other purposes than consumption by his or their own families, such supply shall be furnished by the Company, in such cases, at and after the following rates—that is to say, not exceeding 8d. for every 1000 gallons up to 500,000 gallons; and not exceeding 7d. for every 1000 gallons in excess of 500,000 gallons up to 1,000,000 gallons; and at 6d. for every 1000 gallons in excess of 1,000,000 gallons. In this case Mr. Patterson made application to the Company, requesting them to fix a meter, and they refused. For water for house and trade purposes, he provided one of Tylor's patent water-meters, and on Dec. 24 he informed the Company that he had obtained it, also stating that he should use the water by meter, and giving them notice that he should refuse to pay his water-rate unless charged at the special rate above referred to. The Company refused to supply water in that manner, and would not allow any plumber over whom they had control to do the required work; whereupon Mr. Patterson had the meter united to the Company's main. He subsequently refused to pay his water-rate when demanded, and the Company stopped the supply of water.

In reply to the Stipendiary,

Complainant said the domestic supply of water passed through the meter, and he wished to be charged for that at the rate mentioned in the Act.

Mr. Knight, who appeared for the Company, pointed out that the Act only intended the rate to apply to water supplied for other than domestic purposes.

The Stipendiary thereupon held that Mr. Patterson had no right to do what he had done, and could not claim to be charged at the special rate when he used the water for domestic purposes. The case was therefore dismissed.

SOUTHWARK POLICE COURT.—Saturday, May 8.
(*Before Mr.* Bridge.)

A WATER COMPANY FINED FOR NON-SUPPLY OF WATER.

The Southwark and Vauxhall Water Company were summoned by Mr. Joseph John Kain, the owner of several small houses in George Row, Bermondsey, to show cause why they refused and neglected to supply water to No. 21, thereby depriving the inmates of that and four adjoining houses of the required supply.

Mr. Lickfold appeared for the complainant; Mr. Lanfear, Solicitor to the Company, defended.

It appeared that Mr. Kain was the owner of five houses, Nos. 16 to 21, George Row, Bermondsey, and he contracted with the Company to supply water to No. 21 by a pipe from the main. The other houses received their supply from a pipe fixed to the former, and continued to the other houses, each having a butt to receive the water. The Company were aware of this, but on the 14th ult. the water was cut off from No. 21, so that all the houses were deprived of their supply. A complaint was made to the Company, and on the 16th the water was laid on again; but the complainant, being dissatisfied with the Company's conduct, took the present proceedings to recover damages for the inconvenience.

Mr. Lanfear, on behalf of the Company, contended that they were justified in what they had done, inasmuch as the Company's Act of Parliament, coupled with the Metropolis Water Act of 1871, gave them power to discontinue the supply of water when the apparatus for the reception of the water was defective.

Henry Hopton, one of the waste inspectors in the service of the Company, said that on the 23rd of January last he inspected the houses, and found the pipe and everything correct at No. 21, but the other houses were defective. The water-butts were uncovered, and the water was running to waste at all the houses. He reported the circumstance to his superior officer. On the 8th of March he inspected the houses again, and some repairs had been done, but they were insufficient.

Robert Dunn, one of the Company's superintendents, said from the report of last witness he inspected the houses, and found the water-butts leaky, and not lined with zinc or metal, consequently the water became dirty. As soon as he found Mr. Kain had caused the butts and connecting-pipes to be so placed as to prevent waste, the supply was laid on again.

Mr. Lickfold contended that neither the Company's Act nor the Act of 1871 empowered the Company to do as they had done. The pipe from the main leading to No. 21 and the fittings to that house were proper, consequently the Company had no right to discontinue the supply.

Mr. Lanfear reminded his worship that the fixtures connected with the other houses were defective, and this was the reason the supply was discontinued. Mr. Kain had proper notice of this.

Mr. Bridge said he must decide against the Company, but as the latter had not acted recklessly in the matter he should merely inflict a nominal penalty of 10s., and 1s. for each of the three days the water was disconnected, making in the whole 13s., and 2s. the cost of the summons.

Brighton Corporation Water Supply.—At the last meeting of the Brighton Town Council the minutes of the Water-Works Committee, which were confirmed, contained the annual statement of the accounts of the Department for the year 1879-80. This showed that the expenditure, including £9581 9s. 6d. for working expenses and £17,630 13s. 3d. for interest, amounted to £28,425 9s. 2d., and the income to £33,301 18s. 7d., leaving a balance of £4876 9s. 2d., £4000 of which the Committee ordered to be transferred to the borough fund. The balance of £876 9s. 2d., together with £109 18s. 10d. received during the year for dividends on previous investments, the Committee resolved to invest in the purchase of 3 per cent. consolidated bank annuities.

Proposed Purchase of the Runcorn Water-Works by the Town Commissioners.—At the meeting of the Runcorn Board of Commissioners last week, the Committee appointed to consider the desirability of purchasing the Runcorn, Halton, and Weston Water-Works reported in favour of the water supply of the town being in the hands of the Commissioners, and recommended that a letter should be sent to the Secretary of the Water Company, stating that the Board had under consideration the desirability of acquiring the rights of the Shareholders, and requesting the Company to state whether they would be willing to enter into negotiations for the sale of the works, and to appoint a Committee to confer on the matter, and (subject to the approval of the respective Boards) to decide on a basis on which they could treat. The report was adopted.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the Composition and Quality of the Metropolitan Waters in April, 1880:—

Names of Water Companies.	Total Solid Matter per Gallon.	Oxygen required by	Nitrogen.	Ammonia.		Hardness (Clark's Scale).	
		Organic Matter, &c.	As Nitrates, &c.	Saline.	Organic.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	19·64	0·050	0·142	0·000	0·005	14·3	3·3
West Middlesex	19·23	0·021	0·151	0·000	0·008	13·8	3·3
Southwark and Vauxhall	20·04	0·066	0·142	0·002	0·010	14·3	3·8
Chelsea	20·11	0·008	0·151	0·000	0·004	14·0	3·3
Lambeth	20·82	0·054	0·167	0·000	0·008	14·3	3·8
Other Companies.							
Kent	30·63	0·004	0·203	0·000	0·025	20·6	5·6
New River	19·57	0·016	0·151	0·000	0·005	13·8	3·3
East London	21·75	0·028	0·151	0·000	0·006	14·3	4·2

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours.

The water was found to be clear and nearly colourless in all cases but the following, when it was turbid—namely, West Middlesex Water Company.

C. Meymott Tidy, M.B., &c.

The Society of Arts and the Water Supply.—The Council of the Society of Arts announce that they have decided to summon a public conference, "to consider the question of supplying London with pure water." At present the date for it has been fixed for Monday, the 24th inst., but it may be found necessary to alter the day. The arrangements are now being considered by a Committee, and full particulars will be made known as early as possible.

MAURITIUS GAS COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held at the London Offices, 14, St. Mary Axe, on Wednesday, the 5th inst.—W. White, Esq., in the chair.

The Secretary (Mr. A. Hersee) read the notice convening the meeting, and the following report of the Directors was taken as read:—

The Directors beg to report, with extreme regret, that the Company's operations during the past year have, through adverse exchange, hurricane damages, and other circumstances beyond their control, again resulted unfavourably. This may be not altogether unexpected, for the Shareholders were informed at the last annual meeting that exchange was in such an unsatisfactory condition that heavy loss thereby must be looked for, and that exceptional expenses had arisen in consequence of damages by the unfortunate hurricanes which had just previously occurred; but the extent of the injuries has proved more serious than was anticipated. The average annual loss to the Company by exchange from the commencement has been under 10 per cent., but for the past year the rate was 22½ per cent., causing a difference of about £600 on the amount remitted. The losses by the hurricanes are estimated at more than £500. It will be seen, therefore, that the Company have thus been deprived of a considerable amount of profit.

The new Manager arrived in Mauritius in June last, and entered upon his duties on the 1st of July. It is encouraging to find that the general business of the Company is already showing signs of steady improvement under Mr. Darney's management, and economy is being effected in several branches.

The gas-rental, which declined throughout the first half of the year, recovered to nearly the same extent in the second half, with hopeful prospects of continued increase, and several new consumers have been obtained.

The Municipality have given an order for 23 additional street-lamps (of which 7 were erected towards the end of 1879), and orders for additional lamps are expected.

The consumption of gas by the Port Department and at the Cernée Dock has been resumed, the Garrison Theatre has been fitted up with 80 jets, and efforts are being made to secure the lighting of the Central Railway Station. The non-residence in Port Louis of the wealthier classes, which could not have been foreseen, is a serious drawback, for on extended private consumption of gas the prosperity of the Company so greatly depends.

The price paid for coal in 1879 was higher than in the previous year, owing chiefly to the advance in cost of freight and scarcity of vessels. The extra outlay for coal was partly recouped by increased receipts for coke, and it is hoped that like compensation will be obtained in the current year.

The proposed extension of gas to Curepipe is for the present abandoned. The Manager, having inquired into the matter, is of opinion that separate works, erected at moderate cost, would afford a remunerative profit, provided a minimum consumption of gas at fair rates were guaranteed by Government and others; but, as such assurances are not forthcoming, the Directors decline to undertake such an uncertain extension.

The balance at the credit of general revenue account is £963 8s. 4d., out of which it is proposed to declare a dividend of 6d. per share, free of income-tax (or 1½ per cent.).

The alteration in the nominal value of the shares need now no longer be delayed, and the Directors have determined to recommend the reduction of the capital of the Company to £70,000, divided into 20,000 shares of £3 10s. each, in lieu of £100,000, divided into 20,000 shares of £5 each, whereby the liability per share in respect of uncalled capital will be £1 5s. instead of £2 15s. as at present. An extraordinary general meeting has been summoned to consider the formal resolution approving the above alteration.

The Director who retires from office is James Sydney Stopford, Esq. Both Auditors—John Robinson Peill and Thomas Newton Stokes, Esqs.—also retire. All are eligible for re-election, and offer themselves accordingly.

The Chairman, in moving the adoption of the report, assured the Shareholders that it and the accounts submitted on this occasion were quite as disappointing to the Directors as they would be to the Shareholders, if not more so; but the result was due entirely to exceptional circumstances. When he addressed them last year, intelligence had just reached the Directors of serious damage to the Company's property by the hurricanes. The actual amount of loss had not then been ascertained, but, unfortunately, it proved greater than was expected. The larger gasholder was greatly injured by the first hurricane at the end of February, and was being repaired when the second hurricane at the end of March occurred, inflicting fresh injury to the holders, and entailing an expenditure of more than £300 for repairs. To remedy the damage at the works cost over £50; an outlay of £150 was required to reinstate the broken lamp-posts and glass; the value of the tar lost by the blowing over of the vats was fully £70; and there were many minor losses. So that the Directors were justified in estimating the total loss at about £500. Had that been their only trouble, a more presentable account would have been put before the Shareholders; but the profits had been diminished to an equal extent by the unprecedentedly low rates of exchange which prevailed throughout the past year, and which the Directors were quite unprepared for. He hardly liked to weary the meeting with details, but he should mention that when the Company was started it was believed that the effect of exchange would be scarcely felt. Such was the case during the first five years, when the average loss was only 2¾ per cent.; in 1876 it rose to 14½ per cent., in 1877 it was 13¼ per cent., and in 1878 it was 11½ per cent., thus showing a gradual decline. The Shareholders could, therefore, imagine the disappointment of the Directors at the excessive rise to 22½ per cent. in 1879.

It had actually reached 27 per cent., but was at present at 19, and they could only hope that the improvement would go on. Had they not been subjected to these unfortunate circumstances, the profits would have been sufficient for paying a dividend of 3 or 3½ per cent. The Shareholders were aware that a new Manager was appointed in the middle of the past year, and he (the Chairman) was happy to tell them that Mr. Darney was doing his utmost to increase the revenue and diminish the expenses. His efforts thus far were very encouraging. For instance, the gas-rental had been declining for many months prior to his taking office, but it had since steadily increased. He had also reduced the wages, and had otherwise improved the working of the concern. If the Company's affairs continued to progress as they were now doing under Mr. Darney's management, and no exceptional visitations overtook them, they might reasonably look forward for a decided improvement in their position. Gas appeared to be rising in favour, for some of the Government buildings had resumed the use of it. The Directors were trying to get the lighting of other public buildings, though, in consequence of the low price at which they were supplied, the profit would be small. The Municipality had at last shown a disposition to extend the street lighting, and the Company would probably get a small annual addition to their street-lamps; but they had been compelled to resist the proposals of the Municipality requiring the erection of lamps in isolated and detached localities, where there was no prospect of private lighting. Mr. Darney was also exerting himself to extend the private consumption, but the desired result had only been partially attained. The merchants and persons of means who formerly resided in the town, but who left it at the time fever prevailed, now resided in the country, and the remaining inhabitants seemed unable or unwilling to become consumers of gas. Still, some progress was being made. He was happy to say that coal freights were now lower, and the Directors hoped to do much better in that direction. They had cleared off their entire stock of coke at satisfactory rates, and the demand at present exceeded the supply. There was, unfortunately, not the same demand for tar; but Mr. Darney was using every exertion to create a better market for this product. There was nothing to justify their proceeding with the Curepipe extension, which had been mentioned before. It had been felt from the first that, unless there were some sort of guarantee that a minimum quantity of gas would be taken, at rates assuring a fair dividend on the capital employed, it would be impolitic to take any action towards making provision for the works. Mr. Darney thought that about £10,000 would meet the first requirements, and that the gas need not cost more than it did in Port Louis. The residents expressed themselves in favour of gas, but would not bind themselves to use it, and no distinct promise could be obtained from the Authorities; so that the matter must remain in abeyance. The alteration in the nominal value of the scrip was a step which would serve as a relief to the minds of many Shareholders. In reducing the par value of the shares from £5 to £3 10s. each, sufficient margin had been retained as security for the debentures and for working capital, and there would also be sufficient to carry out the Curepipe extension if it should hereafter come to the Company in an acceptable shape.

Mr. J. S. Stopford seconded the motion.

Mr. H. P. Stephenson said the Shareholders could not help feeling that the report was eminently unsatisfactory, particularly looking to the fact that the price of coal had been lower, and freights lower, for some considerable time. It would be presumptuous on his part to attribute blame to the Board; but he could not help feeling that the accounts that were put before the meeting were in such a very meagre shape indeed that there was not the slightest opportunity on the part of the Shareholders to look into the working of the Company at all. He presumed and hoped the Directors examined into the working, and saw that they were getting all they ought from the management out at Port Louis. He felt very strongly that the Company had been going from bad to worse. First they had a misfortune with their gasholder, then other misfortunes, and they still seemed to be going lower and lower in the scale of profit, and had now arrived at the extraordinary position that the Shareholders only had about 2½ times the Directors fees, which, to his mind, was a thing unique in a gas company. He hoped that the make of gas per ton, the amount of fuel used in the retorts, the details of management, and the wages—that all such points would be most carefully looked into by the Board. He could not but think there was something wrong at the works. No doubt there had been great depression of trade, and no doubt the Company were suffering greatly from the exchanges; still, those were circumstances which he did not think ought to put the Shareholders, with a rental of £7000 a year and an income of about £9000 a year—though, no doubt, very small—in the position of having to receive such a miserable dividend, that one would almost say, "Sell the thing for what we can get for it, divide the proceeds amongst the Shareholders, and get rid of the concern." As to the reduction of the capital, he thought it a most judicious act on the part of the Board; but he could not conceive, going as far as they did, why they did not go farther. What was the necessity for still retaining a liability of about £25,000? To carry out the extension referred to would be most injudicious and improper, unless they could get the consumption guaranteed to them; for if the larger works did not pay, surely the smaller would not. He should advise that the liability be reduced to sufficiently cover the debentures, which he would also pay off afterwards.

Mr. C. Hill dissented from Mr. Stephenson's remarks about the Directors fees. He thought all the Shareholders ought to be indebted to the Board for sticking to the concern as they had done, for it was greatly to the Shareholders advantage that the Directors had had the pluck to do so. The great misfortunes of the Company had been altogether beyond the control of the Board. He hoped the Directors would continue till they secured better results.

Mr. Stephenson said that his remarks were not in the least degree intended to reflect on the Board.

The Chairman, in reply, said they had had a vast number of difficulties to contend with, and over and over again he should have been glad to get away from the concern, if he could have done so; but once engaged in an undertaking, whether good or bad, he felt it was his duty to stick to it. Mr. Stephenson made one remark with which he could not at all agree. He said coals and freights had been very much lower. Coals had been lower, but not to such an extent as might have been anticipated. The best coals the Company had were from Australia, and up to within the last two months they had cost them 14s. a ton. The Directors had therefore been compelled to buy English coals, at about 6s. 6d.; but the freights had been nearly double. There were no home freights from the Mauritius, and for a long time the Directors despaired of getting a ship to go at all. As to the Board, he thought he might fairly say they had been very generally credited with looking into their business. They met very frequently, and went into all the accounts. The difficulty was that they could not go out and personally set things to rights. If they could, he had no doubt that they would make a very different affair of the Company. They, however, looked into every expense, and every voucher came before them, and he could assure Mr. Stephenson that they were not carrying on the concern at more expense than was absolutely necessary.

The motion was unanimously adopted, and the retiring Director and Auditors were re-elected.

The Chairman, in proposing the dividend recommended in the report, said he was almost ashamed to do so, and some large Shareholders had said they would rather not have it; but he thought it would be a pity for them to go into the state of a non-dividend paying company, especially with their present prospects.

Mr. Stopford seconded the motion, and it was carried unanimously.

An extraordinary general meeting was then held with regard to the proposed reduction of the capital.

The Chairman said the matter was entirely in the hands of the Shareholders. They had asked the Board to reduce the capital, for many people thought it looked unsafe to have a quantity of uncalled capital. The Directors had, therefore, agreed to ask the Shareholders to pass this resolution—"That in lieu of the capital and shares of the Company being £100,000, divided into 20,000 shares of £5 each, such capital and shares shall henceforth, until otherwise determined by the Company in manner prescribed by law, be reduced to £70,000, divided into 20,000 shares of £3 10s. each."

Mr. Stopford having seconded the motion,

Mr. Stephenson asked why the Directors required so much as £25,000 of uncalled capital. There were, he contended, no circumstances in the Company that required it, and if he could obtain a seconder he would move that the matter be referred back to the Directors with the view of increasing the reduction further.

The Chairman put the motion, and it was carried. He then announced that within about a month another meeting would be required to confirm the resolution.

Mr. Hill said it was always a pleasant thing to pass a vote of thanks to directors when a company was flourishing, but when it was not, he thought they required such encouragement all the more. He moved a vote of thanks to the Chairman and Directors.

Mr. Stephenson seconded the motion, and it was carried unanimously.

The Chairman, in acknowledging the compliment, said it was certainly under very discouraging circumstances that the Directors appeared before the Shareholders on this occasion. They, however, tried in every way to set the Company on its legs, and his impression was that it would come round. He did not expect it would ever be a very flourishing concern, but he believed it would eventually pay a moderate dividend.

The proceedings then terminated.

AUSTRALIAN GAS COMPANY, SYDNEY, NEW SOUTH WALES.

The report of the Directors of this Company for the half year ended Dec. 31, 1879 (the 88th half year), stated that the profits, after deducting for bad debts, interest on borrowed money, cost of repairs and renewals, and depreciation of plant, working expenses, and all charges, amounted with the balance brought forward (viz., £927 8s. 7d.) to £28,686 16s. 8d. The Directors recommended a dividend for the half year of 7½ per cent., which would absorb £18,740 9s. 6d., and leave a surplus of £9946 7s. 2d.; out of which it was proposed to transfer to the reserve-fund £8315, leaving a balance to carry forward of £1631 7s. 2d. Since their last report the Directors had introduced gas into the borough of Randwick, the inhabitants having promised their substantial support. The public lighting of the borough was commenced on the 1st of January. The following is the

Net Revenue Account, for the Half Year ended Dec. 31, 1879.

Dividend payable July 30, 1879	£18,740	9	6	Balance on June 30, 1879	£23,667 18 1
Reserve-fund	4,080	0	0	The half year's profits	27,759 8 1
Balance to next account	28,686	16	8		
	£51,427	6	2		£51,427 6 2

Liabilities and Assets, Dec. 31, 1879.

Sundry creditors — temporary loans	£106,055	18	3	Fixed investment: — Land, buildings, and machinery at head station and the four out-stations (Haymarket, Woolloomooloo, Balmain, and Petersham); main and service pipes laid; implements and furniture	£329,948	5 1
Suspense accounts	933	17	10			
Capital paid up	249,873	0	0			
Reserve-fund	19,184	5	6			
Reserve for replacement of meters	4,484	3	10			
Dividends unclaimed	1,344	1	2			
Unappropriated profits	28,686	16	8			
				Floating investment:—Coals, residual products, apparatus in store, meters, lamps, and pillars	56,580	1 7
				Sundry debtors	20,371	18 5
				Suspense accounts	2,101	1 2
				Cash	1,560	17 2
	£410,562	3	3		£410,562	3 3

WELLINGTON (NEW ZEALAND) GAS COMPANY.

The report of the Directors of this Company for the year ending Dec. 31, 1879, stated that satisfactory progress was made in the past year. The 5000 new shares were issued in accordance with the resolution of the Shareholders on the 8th of May last, and 4918 of the number were allotted. The available profit was £5212 4s. 5d., and an interim dividend of 7½ per cent. was paid in the month of July last, amounting to £2557 12s. 10d. The Directors recommended the payment of a dividend at the rate of 6½ per cent. for the past half year—all amounts paid in since July 1 to receive dividend as from the date of payment, calls paid in advance receiving interest as agreed—the balance to be carried forward to next account. The new retort-house, containing 96 retorts, had been completed, and would suffice for the requirements of the Company for some years. The mains were extended about one mile during the year, further extensions being in progress. The number of consumers in December was 1503, being an increase of 275 during the year. The following is the

Profit and Loss Account, for the Year ending Dec. 31, 1879.

Coal, wages, and renewals	£14,889	2	9	Balance on Dec. 31, 1878	£5,086	4 10
Less stock on hand	1,592	5	1	Less paid in dividends and reserve	4,273	4 9
	£13,296	17	8		£813	0 1
Amounts written off	247	5	6			
Interest	1,461	7	0			
General expenses—						
Directors, 1878	150	0	0			
Auditors	15	15	0			
Salaries and bonus	780	12	0			
Annual licence	25	0	0			
Legal charges	138	10	2			
Insurance	73	2	4			
Printing, &c.	150	7	4			
Rates	100	15	10			
Stamps and sundries	158	18	6			
Interim dividend and interest to June 30, 1879	2,557	12	10			
Balance	5,212	4	5	Gas-rates and meter-rent, 1879	21,612	18 2
				Products	1,328	6 1
				Goods	352	19 3
				Rents and fees	261	5 0
	£24,368	8	7		£24,368	8 7

CHRISTCHURCH (NEW ZEALAND) GAS COMPANY, LIMITED.

The Fifteenth Annual General Meeting of this Company was held on Monday, March 1—Mr. E. G. WRIGHT in the chair.

The SECRETARY (Mr. C. W. Bishop) having read the notice convening the meeting, the following report was presented:—

In submitting the fifteenth annual statement of accounts, your Directors congratulate you upon the satisfactory result of the year's working. The private consumption during 1878 was 25,272,000 feet, and during 1879, 30,951,000 feet; while the public lamps have been increased from 152 to 202.

The Directors, in their last report, informed the Shareholders that they had contemplated extensive additions to the works, but they had delayed the same pending further information as to how far the electric light was likely to supersede coal gas. Although this question still remains unsettled, your Directors felt convinced that it would not be conclusively determined for some years, and that the public would have just cause for complaint if they failed to meet the public requirements; and, after careful consideration, your Directors decided to proceed with the works during the past year. The arterial main has been enlarged from 10 inches to 18 inches in diameter, and the total mileage of street-mains has been increased from 15½ miles in 1878 to 28¼ miles in December, 1879. The Company are also building a new retort-house, new purifiers and condensers, and a gasholder of a capacity of 300,000 feet, to supply the estimated demand consequent upon the extended area of the Company's operations.

To avoid making heavy demands upon the Shareholders during a period of general depression, your Directors have borrowed a sum of £15,000 from the Australian Mutual Provident Society, for a term of years.

The amount to credit of profit and loss, including the balance brought forward from last year, is £8101 17s. 6d., of which £3336 13s. 4d. was paid as an *ad interim* dividend, and the Directors now propose that a sum of £4320 be paid as a further dividend, leaving a balance of £445 4s. 2d. to be carried forward.

The retiring Directors are Messrs. Blakiston, Cowlishaw, and Wright, who, being eligible, offer themselves for re-election.

Balance-Sheet, Dec. 31, 1879.

Dr.				Cr.			
Capital		£80,000	0 0	Freehold property and buildings	£6,138	6 5	
Loan from A.M.P. Society		15,000	0 0	Working plant, mains, meters, &c.	60,028	0 8	
Interest on loan to date		70	5 5	Office furniture	116	10 7	
Deposits at interest		3,265	0 0	Capital available by calls	32,000	0 0	
Bills payable		3,223	13 6	Unpaid calls	139	0 0	
Debts due by the Company		397	2 8	Shares in P.I. Association	100	0 0	
Insurance-fund		261	4 8	Funds invested	4,000	0 0	
Unclaimed dividends		203	2 5	Debts due to the Company	4,004	0 1	
Reserve-fund		4,788	14 5	Stock on hand, coals, &c.	1,493	10 4	
Balance		4,765	4 2	Gas-stoves	25	6 0	
				Cash at Bank of New South Wales	3,636	19 2	
				Cash in hand	202	14 0	
		£111,974	7 3		£111,974	7 3	

Revenue Account, for the Year ending Dec. 31, 1879.

Dr.				Cr.			
Stock of coal, &c., on Jan. 1, 1879		£898	15 1	Sale of gas and rent of meters	£23,932	10 1	
Purchases of coal, &c., during the year		7,904	15 7	Sale of coke, tar, and sundries	2,574	4 6	
		£8,803	10 8	Rents	119	10 8	
Less stock on hand, Dec. 31.		1,493	10 4	Transfer fees	3	4 0	
		£7,310	0 4	Sale from gas-stoves account	0	15 9	
Stock of gas-stoves, Jan. 1	£26 1 9						
Less stock on hand, Dec. 31	25 6 0						
		0	15 9				
Wages—							
Carbonization		1,438	17 1				
Purification		291	9 10				
Repairs, &c.		380	13 6				
Lamplighters, servicelayers, &c.		895	11 5				
Salaries—							
Secretary, Manager, Assistant Manager, and Collector's commission		1,347	0 0				
Directors fees		400	0 0				
Auditors fees		21	0 0				
Rent, taxes, and insurance		297	0 4				
Tools, materials, and renewals		466	7 2				
Stationery, advertising, and printing		122	12 11				
Law charges		64	2 0				
Miscellaneous		321	19 2				
Discount and interest account		2,520	19 2				
Amounts written off		110	0 7				
Reserve-fund		2,880	0 0				
Depreciation-fund		500	0 0				
Balance		7,261	15 9				
		£26,630	5 0		£26,630	5 0	

The CHAIRMAN, in moving the adoption of the report, said perhaps he might be permitted to point out that the Directors at one time during the past year found themselves in a somewhat difficult position with reference to the proposed extensions. They were threatened with the introduction of the electric light, and the consequent extinction of gas companies, and at the same time they had to consider the demands of the public to supply their wants in the outlying districts, and to increase their supply in the centre of the city. The Directors, for the reasons stated in the report, decided upon the adoption of the bolder course, notwithstanding that it necessitated the employment of something like £25,000 of additional capital. Naturally they felt a little hesitation in the matter, but so far they had seen no reason to regret the step they had taken, and they hoped their action would be endorsed by the meeting. The Shareholders would have noticed that there had been some trouble in connection with sinking the foundations for the tank of the No. 4 gasholder. The difficulty was caused by a bed of quicksand being met with, and this shifting sand caused a settlement in the concrete walls of No. 3 tank, and rendered the holder for a time unserviceable. Just as it was being again brought into use the foundations of No. 2 holder collapsed in a similar way. The lower portion of the tank for the No. 4 holder had now been rivetted together and placed on the foundations, and no further difficulty was likely to arise.

Mr. J. ANDERSON seconded the motion, and it was carried.

Mr. J. GOULD moved—"That the Directors be hereby authorized to pay a dividend in accordance with the recommendation contained in the report."

Mr. THOMPSON seconded the motion, and it was unanimously agreed to.

The retiring Directors were re-elected, and Messrs. Harley and Alport were chosen Auditors for the present year.

The proceedings closed with the usual votes of thanks to the Chairman and Directors.

HASTINGS CORPORATION WATER SUPPLY.—The Water Committee of the Hastings Town Council announce that the working of the undertaking during 1879 resulted in a profit of £4876 9s. 2d., of which amount they propose that £4000 should be carried to the borough-fund, and the remainder (£876 9s. 2d.) to the contingent-fund.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Half-Yearly General Meeting of this Company was held at the London Offices, 30, Gracechurch Street, on Tuesday, the 4th inst.—Mr. H. P. STEPHENSON (in the absence of Mr. T. Hughes, Q.C., the Chairman) presiding.

The SECRETARY (Mr. Alfred Lass) having read the notice convening the meeting, the following report was taken as read:—

The Directors have much pleasure in submitting to the Shareholders the accounts of the Company for the half year ending Dec. 31, 1879. These, with the annexed report of the Engineer, show the progress of the Company.

The Directors have to state that the profit for the half year has amounted to £1508 2s. 2d., which, added to the balance brought from the last account, makes £3007 2s. 10½d., and that after paying the dividends to June 30, 1879, the interest on debentures to Dec. 31, 1879, and transferring a sum of £150 to the reserve-fund, there remains an available balance of £1443 1s. 3¾d., out of which the Directors recommend the declaration of a dividend for the half year ending Dec. 31 last, on the preference share capital at the rate of 8 per cent. per annum, and on the ordinary share capital at the rate of 7 per cent. per annum, both less income-tax (except upon those dividends payable to the local Shareholders), leaving a sum of £275 13s. 3¾d. to be carried forward to the next half year's account.

The Directors retiring by rotation are Arthur Clarke, Captain Henry Thurburn, and Joseph Quick, who, being eligible, offer themselves for re-election.

The retiring Auditor is James Waddell, who, being eligible, offers himself for re-election.

[*Engineer's Report.*]

Gas-Works, Georgetown, Feb. 24, 1880.

To Thomas Hughes, Esq., Q.C., Chairman, and the Directors of the Georgetown (British Guiana) Gas Company, Limited.

Gentlemen,—I have the pleasure of submitting to you my report for the half year ending the 31st of December last, which I hope you will consider satisfactory. The returns which I have forwarded will, I hope, meet with your approval. They will give you full particulars on all matters relating to the working of the Company.

I have much pleasure in stating that the buildings and apparatus are in thorough repair and good working order, and that the gasholders and tanks have not given me either trouble or anxiety. The stelling, or wharf, was partially completed during the past half year; since then it has been finished.

During the half year 15 additional consumers, with 115 lights and 3 stoves, have been added, and 77 additional lights have been fitted to old consumers; making a total of 192 extra lights. The demand for gas has been very good. Coke and breeze have realized fair prices. The gas-fitting department has been fully employed.

In conclusion, I beg to thank the Directors for their attention to our wants in the colony.—I have, &c.,

(Signed) THOS. B. YOUNGER, Engineer and Manager.

Balance-Sheet, Dec. 31, 1879.

Dr.				Cr.			
Share capital—				Fixed plant, mains, and services, as per last account	£35,951	10 3¾	
6200 fully paid £5 shares	£31,000	0 0		Since expended	302	3 5½	
412 £5 preference shares, fully paid	2,060	0 0			£36,253	13 9¼	
Debenture bonds	6,950	0 0		Stock in hand	3,575	14 1	
Insurance-fund account	13	16 10		Cash at bank and in hand	784	3 9½	
Retort renewal-fund account	105	14 9		Bills receivable	1,000	0 0	
Bad debt fund	205	15 0		Amounts owing by sundry persons	2,402	9 6	
Reserve-fund account	650	0 0					
Bills payable	800	8 6					
Amounts owing to sundry persons	735	4 9					
Suspense account	50	0 0					
Profit and loss account, net revenue	1,443	1 3¾					
	£44,016	1 1¾			£44,016	1 1¾	

Revenue Account, for the Half Year ending Dec. 31, 1879.

Coals and bitumen	£895	8 8		Gas and rental of meters	£3,532	5 5½
Purifying account	30	2 5		Residual products and fittings, &c.	613	7 8¼
Wages account	506	14 4¼				
Repair and maintenance of works and plant, &c.	218	5 6¼				
Salaries	623	6 8				
Rent, rates, and taxes	51	0 10				
Directors and Auditors fees	158	8 0				
Trade and general charges	126	16 11				
Bad debts and allowances	27	7 7				
	£2,637	10 11¾				
Balance carried to profit and loss, net revenue	1,508	2 2				
	£4,145	13 1¾			£4,145	13 1¾

Profit and Loss Account (Net Revenue) on Dec. 31, 1879.

Dec. 1, 1879—				July 1, 1879—		
Dividend, &c., to Shareholders to June 30, 1879	£1,167	8 0		Balance brought from last account	£1,499	0 8¾
Dec. 31, 1879—				Dec. 31, 1879—		
Interest on loans, &c., to Dec. 31, 1879	246	13 7		Revenue account, balance brought down	1,508	2 2
Reserve-fund account	150	0 0				
Balance carried to next half year's account	1,443	1 3¾				
	£3,007	2 10¾			£3,007	2 10¾

The CHAIRMAN: I have now to move—"That the report and accounts of the Company be received and adopted," and in doing so I have very few remarks indeed to make. The working of the Company in the past half year is very similar to that of the corresponding half of the previous year. The rental has slightly increased, and the result of the whole half year's work is that our profit is about £110 more than in the corresponding period of last year.

Captain THURBURN seconded the motion, and it was carried unanimously.

The CHAIRMAN next moved, and Mr. ROBERT KING seconded the re-election of the retiring Directors, and the motion was unanimously agreed to.

On the motion of the CHAIRMAN, seconded by Mr. BLYTH, the retiring Auditor was re-elected.

The dividends recommended in the report were then declared, and a vote of thanks having been passed to the Chairman and Directors, the proceedings were brought to a close.

EDISON'S HORSESHOE LAMP *v.* GASLIGHT.—In last week's issue there appeared an abstract of a report by Professor Henry Morton, Professor Alfred M. Mayer, and Mr. B. F. Thomas, on "Some Electrical Measurements of One of Mr. Edison's Horseshoe Lamps." This report is the subject of a short article in the *Scientific American* of the 1st inst., in which the authors make certain additions and corrections. The corrections do not affect our summary, but the following interesting addition is made:—"Two other sets of experiments, made since those given in our paper of April 17, in which the candle power of the loop was in its best position, 17·6 and 19·8 candles, corresponding to averages of 11·7 and 13·2 candles respectively, showed a consumption of energy of 0·104 and 0·109 horse power per lamp, or 9·6 and 9·1 lamps per horse power. This would give 112 and 120 candles respectively per horse power of electric energy consumed or transformed in the lamp. These results certainly agree very closely with each other and with our former determinations."

MIDLAND ASSOCIATION OF GAS MANAGERS.

The Tenth Quarterly Meeting of this Association was held at the Midland Hotel, Birmingham, on Thursday, the 22nd of April. Present:—Messrs. P. Simpson (Rugby), President; C. Hunt (Birmingham), ex-President; J. Tindall (Walsall), Treasurer; W. North (Stourbridge), Hon. Secretary; J. Collett (Dudley); H. Peaty (Burslem); H. S. Pike (Hinckley); J. E. Palmer (Malvern); R. O. Paterson (Cheltenham); J. S. Cranmer (Stratford-on-Avon); W. Winstanley (Newcastle-under-Lyme); J. Annan (Wolverhampton); T. Layton (Redditch); and J. S. Reeves (Bilston).

The Honorary Secretary read the minutes of the last meeting, which were confirmed and signed. He then read the notice calling the present meeting.

The President: I am sorry to say we have received a letter from Mr. Cross, stating that he cannot read the paper he intended. I should also mention that the Committee met previous to this meeting, and recommended for admission as members Mr. John Searle, Manager of the Tewkesbury Gas-Works, and Mr. W. Barratt, Manager of the Grantham Gas-Works.

The gentlemen named were elected by a show of hands.

The President: I need not say how sorry we all feel that Mr. Cross is unable to be present. It has made a great blank in the business of the day. With your permission I will call upon Mr. Hunt to give us his remarks on the experiments recently made at the Windsor Street Gas-Works with lanterns and large burners.

Mr. Hunt: Mr. President and gentlemen, having been invited to lay before you the results of some further experiments with improved lanterns and burners of large power, I do so with much pleasure, although I regret that my other engagements have entirely prevented my writing anything in the shape of a paper upon the subject. At the same time, I have had some little hesitation in making known these results, since the previous ones have been seized hold of by interested parties, and made a kind of advertising medium; but, after all, the interests of the public and of the profession are the first things to be considered. Before handing round the diagrams, perhaps it will be as well for me to relate the conditions under which the experiments were made; after which I shall be glad to answer any inquiry that may suggest itself to the members. Many who are here to-day were present at the inspection of these lanterns a few weeks ago, and are perhaps fully conversant with the arrangements. The ground was first of all levelled, and coated with clean sand, and the posts designed to carry the lanterns that were to be compared with each other placed at exactly the same height above the ground, and at distances of 150 feet apart. Before any tests were made, the lanterns and the chimneys of the Argand burners were thoroughly cleaned. Meters were attached to each burner, and these were adjusted to pass the same quantity before any observations were made, and the consumption checked and adjusted from time to time during the continuance of the experiment. In every case the position of the shadow meter was reversed, and the mean of the distance between the two results was taken as the correct result. That is to say, supposing the observer were looking due north, having recorded the distance at which the shadows were equal, he would then turn himself round and look in the opposite direction, and the mean between the two distances thus obtained was recorded. As a further check, a newspaper was used to ascertain if the light thrown from each burner was equal at the spot recorded by the shadow meter, and the same test was also applied for the purpose of ascertaining the distance at which the observer could read with equal facility. Any doubts as to the accuracy of the tests were resolved by a second test. These experiments that I now lay before you were, I may say, for the most part, carried out by my assistant, Mr. Colson, whose aid in this matter I have previously acknowledged.

[Mr. Hunt then handed round the diagrams—10 in number—which we have had slightly reduced in size, and give them as a separate plate of engravings in this week's Journal.]

The following discussion took place:—

Mr. North thought that although more light was obtained from the Argand burners, they were very objectionable for street lighting.

Mr. Cranmer considered that the cost of the globular lantern would be much against its introduction, although there was no doubt as to its superiority. Its cost for repairs, too, in case of breakage, would probably be double that of the ordinary lantern. From the diagrams it appeared that the light was thrown a greater distance when the clear glass lantern was used, than when one with an opal top was employed; but he would like to know whether more light was not thrown down immediately round the lamp-post in the latter case than in the former. In Stratford they had fixed some globular lamps with opal tops which had given great satisfaction. The public, who were generally hard to please, were in this case satisfied with the result. The lamps cost about 36s. each, while the cost of the old ones would be about 12s.; but in the former case they are made of copper, and in the latter of tin. The cost of the glass would be three times that of the glass in the ordinary street-lamps. After having seen the results obtained by Mr. Hunt, he should certainly try clear glass globes against those with the opal tops.

Mr. Collett said judging from appearances the globular lantern was to be preferred, but he feared that the cost of repairs would be against its general use, especially in the Black Country. He thought the ugliness of some of the new lanterns was quite sufficient to condemn them.

Mr. Tindall wished to know whether Mr. Hunt obtained the photometrical results by using sperm candles, and if he had tried globular lanterns with opal tops against those composed entirely of clear glass.

Mr. Paterson said the consumption of gas in the spherical lamp was not recorded. It was stated a few minutes ago that with opal glass in the upper section of the lantern, part of the light would be reflected to the pavement, and part would pass on to light the space above the lantern. If, however, clear glass were substituted for the opal, less light would be reflected to the pavement, and consequently a greater portion would pass on to light the space overhead. With clear glass, therefore, while there would be a less brilliant light on the pavement, there would be a better or more equal diffusion of light all around the lantern than would be the case if the upper section were glazed with opal glass. If the opal top was injurious to the overhead light by diminishing its intensity, it was clear that the same condition did not exist in the tests between the spherical and octagon lanterns referred to, because in the former case clear glass alone was used, while in the latter the upper section was of opal glass. The shadow meter was intended to show the relative intensity of the two lights; but if the spherical lantern was allowed to light to the utmost the overhead space, and this light was taken advantage of at the shadow meter, the octagon lantern with its opaque top, and consequently dimly lighted overhead space, was placed at a disadvantage. The top light could not be excluded from the calculation. If a light was placed behind a brick wall, although the light itself could not be seen, there would be a lighted atmosphere all around, and the rays of light projected above the wall might be measured relatively with the shadow meter. He used this illustration to show that top light was an element which could not be ignored in the estimation of the relative values of burners and lanterns, and under different conditions of the atmosphere it was probably of more importance than was generally attributed to it. It was a question, whether lanterns with opal tops were better adapted to street lighting than those with clear glass, or whether the spherical form gave more light, with equal quantities of gas, than either the octagon or the square form. At present he was not inclined to believe the matter settled.

Mr. Annan said it seemed to him that there was a greater reflection from a circular lamp than from a square one, because it was more concentrated to a given point.

Mr. Peaty thought that when the light was in the middle of the lantern it must go straight out in every direction. He fancied the explanation might be that if it was a square lantern the light did not go straight out—it must strike more or less at an angle, and some of it was lost.

Mr. Hunt, in reply, said that he fully agreed with the objections that had been stated to the Argand burners. In Birmingham they were about adopting flat-flame burners in clear glass globular lanterns, the expense of which would not be great if a large number were required. The height of the lantern must be increased in proportion to the magnitude of the light, as pointed out by Mr. Sugg last year. The opal tops threw a little more light immediately around the base of the column, but they also absorbed a very large quantity, and he was of opinion that they were not at all required, and that nothing would be found to be better than all clear gas. Although the experiments were not decisive upon the point, he believed that the globular lantern diffused the light better than any other form. This, in fact, was borne out by experiment No. 2, in which, under the same conditions, the light from the globular lantern was as good at 80 feet as that from Bray's own shadowless lantern was at 70 feet. The burners were in all cases tested in the photometer-room against a standard burner consuming 5 feet of gas per hour—the gas having been previously tested in the ordinary way. He believed it was quite possible to get a shadowless effect with clear lanterns. In reply to Mr. Paterson, he said that he did not see how the rays of light passing upward could influence the results obtained by the shadow meter, unless they were reflected, and this could not have been the case in any of the experiments.

The President: We have had a very nice conversation, and, as an Association, are deeply indebted to Mr. Hunt for his great kindness in this matter, not only to-day, but on previous occasions, and especially on that particular night when we had the privilege of viewing the experiments under very pleasant circumstances. I am sure I spent a pleasant night myself, and I have no doubt all were highly gratified and entertained, and went away very much informed. We have had still more information to-day, and it is a subject we might all do something in. If we cannot all try with large lamps we can try with small ones, and at some other meeting we might bring forward the experiments with small lamps as well as large ones. I am pleased we have Mr. Cranmer here, because it is a great thing to have those here who have been trying the experiments, and it is satisfactory to find that he agrees in general with Mr. Hunt in favour of circular lamps. I personally thank Mr. Hunt for introducing the subject, and giving such a lucid account of the various experiments, and will move that our thanks, as an Association, be given to him.

Mr. Paterson: I have much pleasure in seconding the vote of thanks to Mr. Hunt for his excellent information given us to-day. We must go away with the desire to carry out more of these experiments. Although Mr. Hunt has done so much to relieve us from the drudgery, no doubt something more can be done yet. Information of this kind gives us an idea of the importance of what we are doing.

The motion was carried.

Mr. Hunt said that he could only express the great pleasure he had felt in bringing these experiments before the Association, and for the general appreciation of them. At any time any information that he might have, and was at liberty to impart to his fellow-members, was at their service.

The President: There is the subject of securing papers for future meetings. This is a question which must have your serious consideration. I will not detain you upon it, as we have had such an interesting discussion; but you will see the propriety of having papers provided in good time before our meetings. I would ask you all to think over what paper you would like to give us, and send your names to the Secretary, and perhaps you will not take offence if you do not get the first turn. But we should like to have one or two in hand. At the last meeting we almost persuaded Mr. Woodall to give us a paper to-day. He was going through some experiments, but they have not turned out as he expected, and he is not, therefore, able to bring the subject before the meeting.

The Honorary Secretary then entered the names of several members who were willing to undertake papers.

After a short discussion, it was agreed, in view of July not being a period when many of the members could conveniently meet, to hold the next meeting in October.

WEST OF SCOTLAND GAS MANAGERS ASSOCIATION.

The Eighth Annual Meeting of this Association was held in the Town Hall, Hamilton, on Thursday, the 29th ult.—Mr. Robert Mitchell, of Coatbridge, the President, in the chair.

Mr. S. Dalziel (Kilmarnock) the Secretary of the Association, read the minutes of the previous meeting, which were approved.

Election of Office-Bearers.

The following gentlemen were unanimously elected Office-bearers of the Association for the ensuing year:—

President—Mr. R. S. Carlow, Port Glasgow.
Vice-President—Mr. S. Dalziel, Kilmarnock.
Secretary—Mr. J. Johnston, Hamilton.
Treasurer—Mr. W. Smith, Helensburgh.
Auditors—Mr. D. Black, Wishaw, and Mr. L. Monk, Lanark.
Committee—Messrs. R. Mitchell, J. Fullerton, D. Jeffrey, J. M'Gilchrist, J. Renfrew, W. Young, and S. Stewart.

Mr. Carlow returned thanks for the honour conferred upon him.

The Auditors report—which stated, *inter alia*, that £20 had, during the past year, been given from the Benevolent Fund to persons in need of assistance—was adopted on the motion of the President, seconded by Mr. Renfrew.

President's Address.

The President then read his Valedictory Address, which was as follows:—Gentlemen,—Allow me at the outset to congratulate the Association on its present meeting in Hamilton. It is not the first time in the comparatively short history of the Association that its members have met within these historic bounds; and although, as a body of gas engineers combined for the purpose of forwarding the interests of gas manufacture, we have nothing to do with considerations such as bear on the civil and religious struggles of our ancestors, or the particular spots which are interwoven in the history of these struggles, it does lend a charm to our meeting to think that the surrounding district is distinguished in history as the place where patriots have fought and bled for their country. The march of civilization is rapidly and effectually eradicating the romantic and the beautiful. The whilom inaccessible recesses of Cadzow's ancient forest have been laid open by the woodman's axe, or the slower yet equally sure ravages of the elements, and gaping pits and noisome machinery are rampant. Since our previous meeting in this town, many

(1)

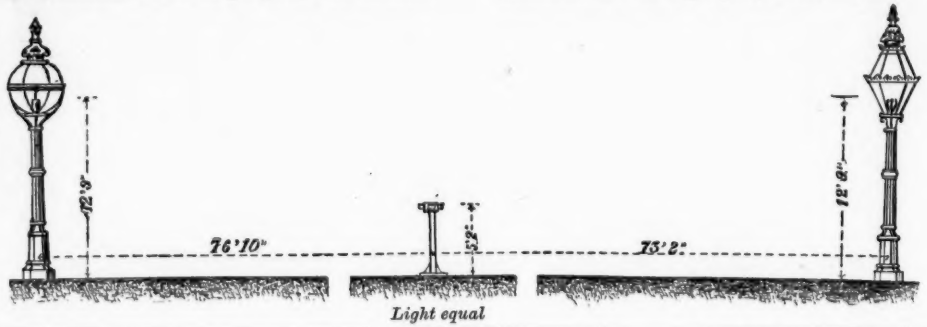
SUGG'S 200-CANDLE ARGAND, consuming 46·75 cubic feet per hour, fixed in globular lantern 36 inches diameter, with opal top.

V.

BRAY'S 200-CANDLE QUADRUPLE, consuming 46·75 cubic feet per hour, fixed in Bray's shadowless lantern.

Photometrical value per foot, 3·95 candles.

Photometrical value per foot, 3·34 candles.



Light equal

(2)

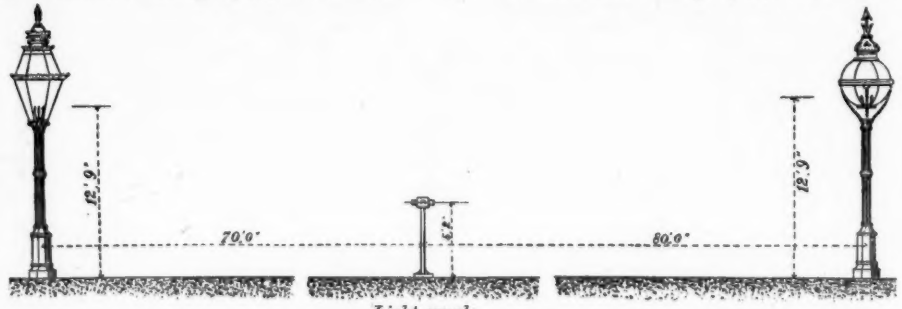
BRAY'S 200-CANDLE QUADRUPLE BAT'S-WING, consuming 46·75 cubic feet per hour, fixed in Bray's shadowless lantern.

V.

BRAY'S 200-CANDLE QUADRUPLE BAT'S-WING, consuming 46·75 cubic feet per hour, fixed in a clear glass globular lantern.

Photometrical value per foot, 3·34 candles.

Photometrical value per foot, 3·08 candles.



Light equal

(3)

BRAY'S 200-CANDLE QUADRUPLE BAT'S-WING, consuming 46·75 cubic feet per hour, fixed in Bray's shadowless lantern.

V.

BURNER AND LANTERN used by the Paris Gas Company in the Rue du Quatre Septembre, consumption 46·75 cubic feet per hour.

Photometrical value per foot, 3·34 candles.

Photometrical value per foot, 2·90 candles.

(6)

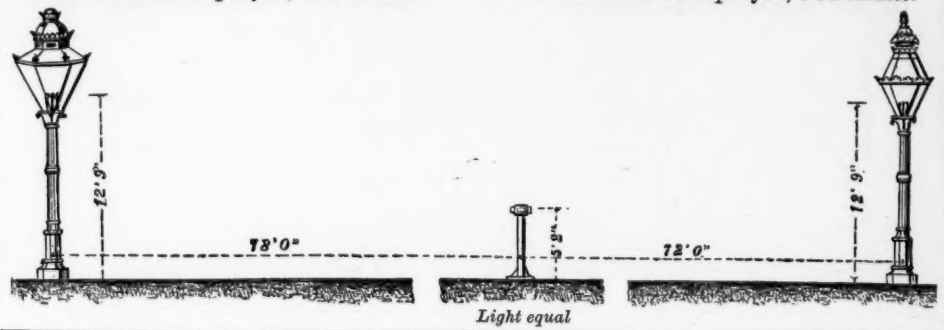
SUGG'S 200-CANDLE FLAT-FLAME BURNER, consuming 47·36 cubic feet per hour, fixed in Sugg's octagon lantern.

V.

BRAY'S 200-CANDLE QUADRUPLE BAT'S-WING, consuming 47·36 cubic feet per hour, fixed in shadowless lantern.

Photometrical value per foot, 3·42 candles.

Photometrical value per foot, 3·34 candles.



Light equal

(7)

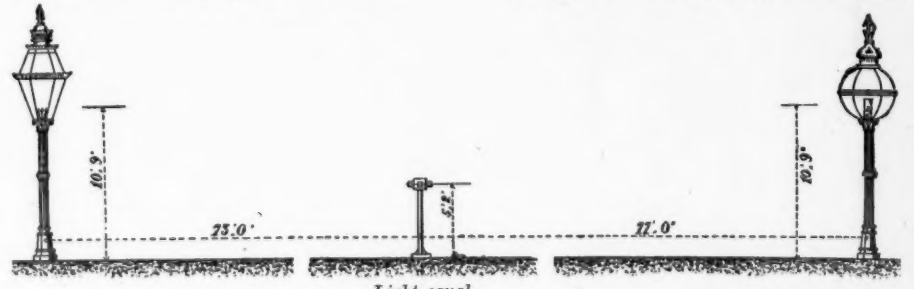
BRAY'S 60-CANDLE TRIPLE BURNER, consuming 22·08 cubic feet per hour, fixed in shadowless lantern.

V.

SUGG'S 80-CANDLE ARGAND, consuming 22·08 cubic feet per hour, fixed in globular lantern with opal top.

Photometrical value per foot, 2·92 candles.

Photometrical value per foot, 3·26 candles.



Light equal

(8)

BRAY'S 60-CANDLE TRIPLE BURNER, consuming 21·17 cubic feet per hour, fixed in globular lantern with opal top.

V.

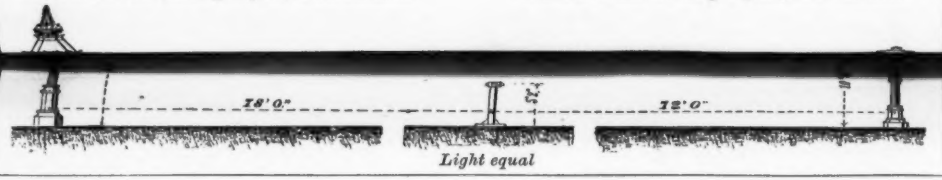
SUGG'S 80-CANDLE ARGAND, consuming 21·17 cubic feet per hour, fixed in shadowless lantern.

Photometrical value per foot, 2·92 candles.

Photometrical value per foot, 3·26 candles.

Photometrical value per foot, 3·34 *candles.*

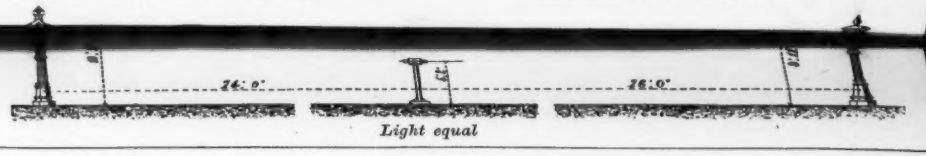
Photometrical value per foot, 2·90 *candles.*



Light equal

Photometrical value per foot, 2·92 *candles.*

Photometrical value per foot, 3·26 *candles.*



Light equal

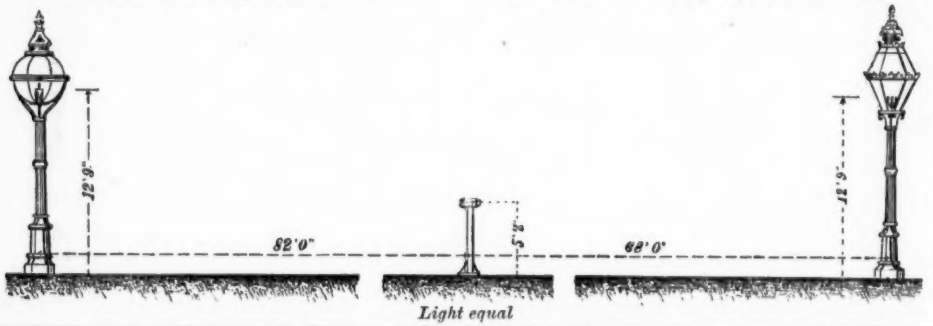
(4) *V.*

SUGG'S 200-CANDLE ARGAND, consuming 45·85 cubic feet per hour, fixed in globular lantern, 36 inches diameter, with opal top.

Photometrical value per foot, 3·95 *candles.*

BRAY'S 200-CANDLE QUADRUPLE BAT'S-WING, consuming 45·85 cubic feet per hour, fixed in Bray's shadowless lantern.

Photometrical value per foot, 3·18 *candles.*



Light equal

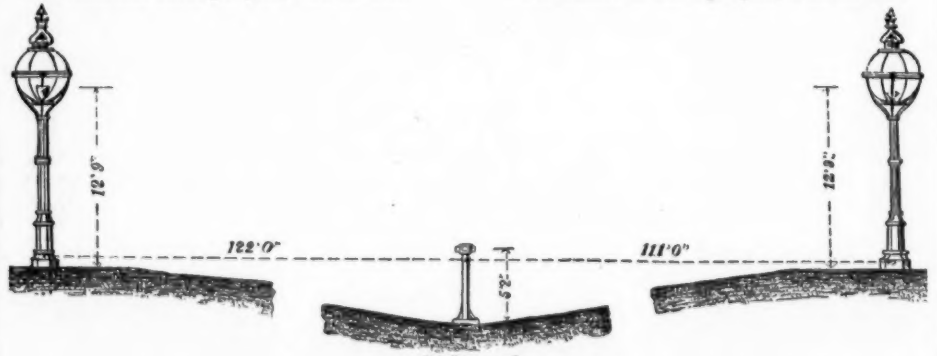
(5) *V.*

SUGG'S 200-CANDLE ARGAND, consuming 43·37 cubic feet per hour, fixed in globular lantern, 36 inches diameter, with opal top.

Photometrical value per foot, 3·95 *candles.*

BRAY'S 200-CANDLE QUADRUPLE BAT'S-WING, consuming 43·37 cubic feet per hour, fixed in clear glass globular lantern.

Photometrical value per foot, 3·08 *candles.*



Light equal

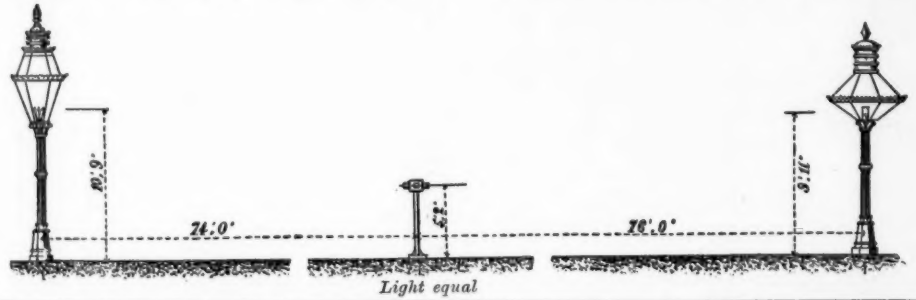
(9) *V.*

BRAY'S 60-CANDLE TRIPLE BURNER, consuming 23·07 cubic feet per hour, fixed in shadowless lantern.

Photometrical value per foot, 2·92 *candles.*

SUGG'S 80-CANDLE ARGAND, consuming 23·07 cubic feet per hour, fixed in shadowless lantern.

Photometrical value per foot, 3·26 *candles.*



Light equal

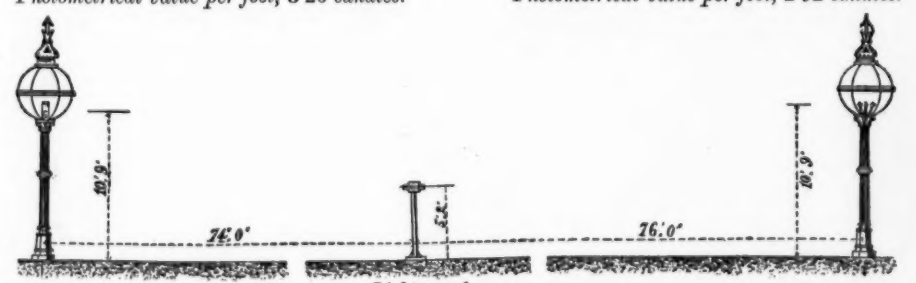
(10) *V.*

SUGG'S 80-CANDLE ARGAND, consuming 22·92 cubic feet per hour, fixed in globular lantern with opal top.*

Photometrical value per foot, 3·26 *candles.*

BRAY'S 60-CANDLE TRIPLE BURNER, consuming 22·92 cubic feet per hour, fixed in globular lantern with opal top.

Photometrical value per foot, 2·92 *candles.*



Light equal

* The glass in this lantern was observed to be very thick and opaque, and could not, by cleaning, be rendered as clear as the glass in Bray's lantern.

LANTERN AND BURNER TESTS AT BIRMINGHAM.

[See Mr. HUNT'S REMARKS at the MEETING of the MIDLAND ASSOCIATION OF GAS MANAGERS, April 22, 1880.]

changes in this direction have taken place. The town is surrounded by a cordon of pits, and Hamilton may now be regarded as the centre of the coal industry of Lanarkshire. Connected as our Association intimately is with the destructive distillation of the products of these pits, I regard Hamilton, without any consideration at all of the beautiful, as a most appropriate meeting-place for the members of the Association.

I have to thank you, gentlemen, for the great interest you have manifested in the affairs of the Association, and I take this opportunity of expressing my thanks to the members of the Committee for their attendance at our various meetings, and the encouragement afforded me in the discharge of my duties as your President. I congratulate you on your selection of my successor, Mr. Carlow. You have in him a gentleman who will reflect credit on the Association; and I feel confident that whatever is in his power for the furtherance of the usefulness of the Association will be carried through with his wonted zeal and indefatigable energy.

I again ask your indulgence while I make a few remarks on subjects which are more or less interesting to all of us, and in so doing I will endeavour to be as brief as possible, as the programme of business is lengthy, and as there is nothing more hurtful to the author of any paper than the want of sufficient time for the proper discussion of its various points.

Since the electric "scare" two years ago, every gas engineer has been more than ever diligent in research—experimenting, and working out some scheme which might be instrumental in cheapening the production of gas, whether in the retort-house or any part of the apparatus, or in the proper combustion of the gas after it is produced. Many deserve the best thanks and encouragement of all of us for their arduous labours. What has been the result of the last two years experience?

We have reached a point when there is an appearance of a thorough revolution of not a few systems of working, and as the retort-house is the most important place in which any change that would have a direct influence on the reduction of first cost of the article produced could take place, there we might now reasonably expect this, if we consider the various systems of generator furnaces, mechanical stokers, and other alterations, or the hydraulic main with and without dips, with and without valves—in short, with and without hydraulic mains—that are now in operation. In passing, I would say a few words with reference to furnaces. Generally speaking, in the coke produced from cannel coal, which forms the larger portion of the firing used in Scotch gas-works, the quantity of ash ranges from 10 to 20 per cent. The inferiority of the cannel coke is in many instances improved by an admixture of free or heading coal, but the percentage of the fuel consumed for a given quantity of gas produced in many cases bears no resemblance to each other, and instances are to be found where only a small proportion of the make is sold. Economy in fuel being a matter of great importance to every gas manager, careful attention is necessary so that the admission of air to the furnace should be in proportion to the amount of work required.

On the careful building of the retort-bench success in carbonizing in no small degree depends. The material used ought to be well selected, the joints of the brickwork should be as close as possible, and to allow the bricks to take thorough hold they should be dipped in water, so that the moisture in the fire-clay will not be absorbed quickly, and no setting ought to be heated up for at least three weeks after completion, which should not be by very high firing, so that the moisture may be driven out slowly, and leave the building one homogeneous mass.

The retorts generally used in Scotch gas-works are D-shaped and oval; experience having proved that these are more advantageous for gas manufacture than the round ones, which were the favourite for so many years, although the last mentioned are by far the strongest and most durable. I consider that D-retorts, 24 in. by 14 in., and 8 ft. 6 in. long, a most serviceable size, set four in one oven, with an oval top 24 in. by 15 in. by 8 ft. 6 in. The length stated is only applicable to works where they work single ovens, owing to the fact that they cannot in the light season have more than, say, two stokers on each shift. In larger works, where the number would never be less than six stokers, three through retorts of like dimensions could be worked to advantage.

Those of us who are located in the midst of the iron industry have many opportunities of witnessing the action of the gas furnaces on Siemens's principle. The adoption of this style of gas furnace to a retort-bench would in many cases be very expensive, especially where the charging-floor was the firing-floor, as it would necessitate the entire alteration and reconstruction of the bench. Not so in many of the large works, where the charging is carried on with a stage. Under this condition there is not any real difficulty in the adoption of the Siemens furnace, and I am confident the saving effected in wages, not to speak of the increased amount of work which might reasonably be expected out of the same number of ovens, as compared with our present system, would be very considerable. One argument against the adoption of these furnaces may be that of the increased quantity of coke at the disposal of the gas company. Then we should have to go on the principle of small profits and quick returns.

Another form of generator furnace is that known as Oechelhäuser's. This furnace would require but a very slight alteration for its adoption in any of our gas-works. It is nothing more nor less than a tapered shaft furnace, with a strong iron grate for the bottom, the bars of which are made sufficiently wide for the admission of air, and also to allow any slag which may gather being removed. The air passing through the grate, and coming in contact with the incandescent fuel, forms first carbonic anhydride (CO_2), which, after passing upwards through the layers of heated fuel, is converted into carbonic oxide (CO), while at the same time some of the fuel is undergoing destructive distillation, thereby causing a certain amount of hydrocarbons to be thrown off into the passing gas. Water or a steam blast might be used under the bars. If water were used, it would become vaporized, and, passing through the highly heated fuel, would be decomposed, adding additional heating power to the gas formed, carbonic oxide being formed and free hydrogen, thus—$2H_2O + C_2 = CO_2 + 2H_2$. By careful working of one of these furnaces, the desired temperature could be uniformly kept by regulating the proportions of air at the ports. The intensity of the flame could be varied with as great ease as an ordinary blowpipe.

Before leaving this very important subject, I would name a few of the great points of importance to us, as gas managers, that the gas furnace has over the present system. With a gas furnace we could (1) use an inferior description of fuel, such as a mixture of coke, small dross, or peat; (2) the cost in the retort-house would be reduced by having fewer stokers; (3) the amount of work done by each oven would be greater, owing to the almost unlimited calorific power at our disposal; (4) a larger yield of gas per ton would be obtained, owing to the uniformity at which distillation could be carried on; and (5) the durability of the retorts would be extended, all clinkering and feeding the fires having been dispensed with. In the ordinary system, the draught of the chimney has full scope over the entire setting, and causes a diminution of temperature, consequently a slight contraction of the retort; and the air admitted during these operations, say, at 60° Fahr., is heated, say, to 1200° Fahr., and it is quite evident that this increased temperature is due to the heat of the retort, and that therefore there is a loss of heat on the setting. This great loss of heat is obviated by the use of the gas furnace. I may mention that the nearest approach to the gas furnace that I have yet seen in retort-setting is that carried out by Mr. Hislop, of Paisley, where he takes advantage of the waste heat of the flues to heat the air previous to its admission to the ovens, which is done by an ingenious arrangement of vertical flues and small dampers, although I do not think Mr. Hislop would set his arrangement against the one I have just described.

For many years there has been a great desire on the part of not a few gas engineers to have the hard and laborious work of the stoker, if not supplanted, at least reduced to a minimum, by the introduction of some mechanical appliances. In no piece of apparatus in connection with gas manufacture is there greater diversity of engineering skill shown than in the machines patented from time to time for charging and drawing retorts, each patentee thinking, no doubt, that he has solved the problem. As this is a subject in which I take considerable interest, my inclination was to have gone fully into it, but the time at my disposal would not admit such a digression. I fully expected to have been able to give you at this meeting a few facts as to the working of the two systems which claim the supremacy for charging and drawing retorts. I refer to the Foulis and the West machines. Feeling assured that the days of shut gates to brother managers were ended, I put myself to considerable inconvenience so that I might see the two systems. I visited the works where these machines are in operation, and was most courteously received by the Engineer, who, unfortunately, had another engagement, and could not accompany me to see the machines at work. Before leaving me, however, a message was sent to one of the patentees, stating that I was there, and wished to see his machine working; my curiosity being increased on having read the figures which appeared in the JOURNAL OF GAS LIGHTING a few weeks before my visit, as to the amount of work capable of being done by this particular machine. I waited till my Scotch patience was exhausted, without seeing either the patentee or his machine, and left the station no wiser than I entered it. Since then, however, a "report" has been issued on the two systems, after a comparative trial, and this does not require any remark from me, as every gas manager can form his own opinion of the various circumstances and the results. One point brought out in connection with Mr. West's machine, and to which there appears to be attached considerable weight, is the breaking of the coal. I believe it to be the experience of many gas managers that if coal is not broken into reasonably small pieces the yield of gas will not be so great as if it has been; but even on this point there is difference of opinion. I visited a works some time ago where the coal was being charged in lumps having a cube of at least 200 inches, and the yield of gas from that works over the year's working was fully 11,000 cubic feet per ton of coal carbonized; so that in different localities the material to undergo distillation requires different treatment. My own opinion is that the length of the pieces is not so much a hindrance to the evolution of the gas as the thickness. As the retorts most in use in Scotland are D-shaped, with a good stoker there is little difficulty in having the charge put in in good time and evenly. I read some time ago of a meeting of gas engineers, where mechanical stoking was the subject of discussion. One gentleman mentioned that the time for charging and drawing a retort was "nine minutes." Then, in these circumstances, a great saving could be effected by that gas company with the use of the mechanical stoker. I consider the time mentioned much in excess of what it should be. An oven of five retorts can easily be drawn and charged in from ten to twelve minutes by two men; but we must look to having a simple reliable machine, and companies having works laid down suitable for their use ought to encourage every attempt at overcoming the difficulty. The patentees of the two machines I have mentioned, and also Mr. Warner, of South Shields, deserve the best thanks of the whole gas community for their endeavours in this way.

That every gas manager should have the means of satisfying himself as to the position he has attained in the production of gas from the material employed, it is essential that he should make periodical testings of the deliveries of coal at his works, because although an analysis of the coal produced at the pit at a certain date be correctly made, it might bear a a very indifferent relation to the coal raised from the seam that day six months. We have many instances of changes or variations in the quality of the same seams in this district, so much so that in two pits belonging to the same firm the difference in the yield of gas per ton of coal is known to vary from 1000 to 1500 cubic feet, and the quality from one to two candles. Take the Kirkwood seam as another example of the changes in the same strata—two pits within a very short distance of one another. The No. 1 coal, as it is named, gives over 1100 cubic feet more gas than No. 2, and the quality of the gas is 1¼ candles better. In fact, in one part of the field operated on by one of the pits named, the two classes are raised, the physical characteristics of the coal being very different. I only cite these two instances to show that a change in the quality of the coal may occur, while the seller may be acting perfectly honestly with the purchaser. He cannot foretell the upheavings of the field he is engaged on, all having their dip and rise, and their dislocations, which might throw the seam up or down, or thin it out and away from him altogether. But in all these changes how important it is that the manager should be able to know, both for his own satisfaction and that of his company, the constituents of coal, which may be classed in the following order:—(1) The combustible non-illuminating constituents. (2) The illuminating hydrocarbons. (3) The constituents that are not essential as regards illumination. (4) The impurities. As there are not two seams alike in the proportion of these constituents, hence the cause for, and the advisability of gas managers endeavouring to overcome any little difficulty in their way to enable them to make periodical tests for their own satisfaction as to the material they are called upon to use.

I fully expected that we should have been favoured with a paper on scrubbing and washing, by Mr. Monk, of Lanark, and I regret very much that he has not been able to see his way to give it. This is a subject of great importance, and, as far as I can learn, Mr. Monk has been very successful in his adaptation. His arrangement is thoroughly unique, and is effective in its action. I trust that at no distant date we shall have Mr. Monk with a paper on his system of condensing, scrubbing, &c.

The amalgamation of the two Associations is again to be brought up, and this time for disposal. I hope you will consider calmly the importance of the step under consideration. The change cannot injure the Association asking your co-operation, but I am afraid many members who have stood by this Association in the struggles of its infancy will be somewhat difficult to convince of the improvements that may accrue from the annihilation of the West of Scotland Association as it now stands. Seeing, then, that it is a matter of great importance to you as members, I again ask you to consider well what is your duty, in the best interests of the Association, and the advancement of the object of its existence.

Mr. Niven has been induced (no doubt from his experience of the now recognized tables for correcting the quantity and quality of the gas under examination) to strike out in a new line of thought, and, as it were, to make a short cut. From Mr. Niven's clear philosophical mode of reasoning, and his good sound logic, I have no doubt we shall have a highly interesting and instructive paper from him. Most of us who have used the tables have found, I dare say, very little inconvenience in their application; but we shall be glad to hear Mr. Niven's views on the subject.

We have a paper from Mr. Brodie on gasholder construction. From

the nature of the subject, and his long experience in the work on which he has kindly consented to give a few remarks, I have no doubt it will be like its author—thoroughly practical, and full of good sound advice.

On Mr. Hislop's lime process I will say but little, as the report of our Committee will fully convey to you their finding of a test made under their supervision.

Mr. Mayer has volunteered his services at this meeting as a contributor, by way of a paper on "Painter's Hydrostatic Joint for Gas and Water Mains." It is a little unusual to have gentlemen outside the Association giving papers; but if the end and aim of the Association is to be attained, papers must be forthcoming. There are many inventions and new adaptations in every department of the manufacture and distribution of gas, which cannot fail to elicit much interest and profitable discussion, and the members must really consider their duty to the Association. We cannot all of us be listeners, otherwise the progress will not be creditable to the character of the Association. Hitherto the work done has been good, and I may be pardoned if I say it has not been without its influence and benefit to the gas world. It is not necessary that the papers should be embellished by fine oratory. We want the important subjects connected with our every-day experience brought forward and discussed in a simple, homely, and business-like manner. Then the contributor of the paper will be benefited himself, and will have the pleasure of knowing that he has furnished his quota to the furtherance and the extension of the usefulness of the Association, because it is by individual effort alone that success can be attained. I consider it an injustice to your own feelings, if you are possessed of an opinion on any subject which may be under discussion, should you, through diffidence, allow the opportunity to pass without giving expression to it. Do your part of the work nobly. You would not consider it complimentary if some of your neighbours were to undertake the management of your affairs. In the same spirit, show that you realize the responsibility you are placed under to the Association by forming a part of its membership, and doing your share of its work cheerfully, and show that you are worthy of membership in an Association which has for its object mutual improvement and advancement in our professional duties.

A hearty vote of thanks was, on the motion of Mr. Dalziel, accorded to the President for his interesting address.

[The report of the further proceedings at the meeting will be given in subsequent numbers of the Journal.]

THE APPROPRIATION OF GAS PROFITS AT MANCHESTER.

The Quarterly Meeting of the Manchester City Council was held last Wednesday—the Mayor (Alderman Patteson) in the chair—when a report was submitted by the Town Clerk (Sir Joseph Heron), conformably to a resolution passed at the previous meeting, on the 7th ult.—"That the Town Clerk be requested to examine the various Acts of Parliament which regulate the purposes to which the surplus gas profits may or are to be applied, and to prepare and submit a report to the Council, showing the legal position both of the Gas Committee and the Council in relation thereto."

The report contained an extract from a lengthy report made to the Gas Committee by Sir J. Heron, in 1864, in which all the various clauses in several Acts of Parliament (now, in fact, repealed) bearing on the question were set forth. The Town Clerk submitted that the references to the provisions in the various Acts of Parliament clearly showed:—

1. That the gas-works belong to, and are the property of the inhabitants or ratepayers of the township of Manchester.
2. That such works and the management thereof are vested in the Corporation as trustees for the inhabitants of such township.
3. That the mortgage debt owing and secured upon the gas-works is the debt of such township.
4. That the amount of profits fairly or reasonably obtainable by the manufacture and sale of gas can only be determined by reference to the capital employed; or, in other words, the value of the property employed in its manufacture.
5. That the amount obtained upon mortgage for the purposes of the gas-works, or which may at any time be owing, in no way affects the value of the works.
6. That so far as the property in the gas-works, and the rights of the township of Manchester in respect thereof, are concerned, it is immaterial whether the amount expended on such works has been paid out of the surplus profits belonging to the inhabitants of such township, or out of moneys borrowed upon the security of their property; and that, assuming that the whole of the debt contracted had been paid off, and that there was no charge whatever upon the gas-works—that there was not, in fact, one farthing of debt owing—the capital employed, as represented by the value of the works belonging to the inhabitants of the township of Manchester, would remain the same.
7. That the whole of the surplus rents or profits obtained by the supply of gas belong to, and ought—subject, of course, to any special legislation upon the subject—to be expended for the benefit of the ratepayers at large of such township; and that by the law now in operation the surplus profits are required to be expended "in and towards the improvement of the township of Manchester."

The report next submitted for the information of the present members of the Council a copy of a further report on this subject, made by the Town Clerk to the Gas Committee, and by them presented on Feb. 4, 1874, to the Council. That report stated:—"The gas-works belong to, and are the property of the inhabitants of the township of Manchester, and such works and their management are vested in the Corporation, as trustees for the inhabitants of such township. Such is the strictly legal position; but for the purpose of this report, it will be assumed that the gas-works belong to the inhabitants of the city, and that they are vested in the Corporation as trustees for the whole of such inhabitants. It is the obvious duty of the Council, as such trustees, to secure by the sale of gas, at a fair market price, a reasonable return upon the capital—or, in other words, upon the value of the property—employed in the manufacture of gas; and that return the Council has determined ought to be 10 per cent. To sell gas at cost price, or at any price avowedly below the fair market price, would be an absolute breach of trust; it would be to deprive the inhabitants or ratepayers at large of profits or returns on the capital employed, to which they are fully entitled, in order to benefit the gas consumers only, who form but a portion of the ratepayers of the city, and would be such a breach of trust as would, in the opinion of the Town Clerk, be prevented or restrained by a Court of Equity. Some years ago the Gas Consumers Association was formed in order to effect a reduction in price. They sought to obtain gas, not at cost price, but at what they contended was the fair market price, and they fixed that price—with the then low-priced coal—at 3s. 9d. per 1000 cubic feet; and it is certain that when that price was sanctioned the Association voluntarily ceased to exist. Liverpool is supplied with gas by a private Company, which, like the Corporation of Manchester, enjoys a complete monopoly; whilst the population is greater, and the consumption of gas more general than in Manchester. In Liverpool, equal facilities for obtaining coal and cannel exist; and for a long period (during which the price of gas was lower than in Manchester) the gas consumers here pointed to the price paid in Liverpool as the price which ought to be charged in Manchester. At the present time the price in Liverpool is 3s. 9d., whilst it is only 3s. 8d. per 1000 feet in Manchester. It is true that the Council has determined that a return of 10 per cent. upon the capital employed in the supply of gas ought to be obtained, for the benefit of the ratepayers generally; but—even if necessary to secure such return—it would be difficult to defend a higher price in Manchester than might be charged in Liverpool. The amount of profits made (so long as they do not exceed the percentage allowed), or the appropriation of such profits, has nothing whatever to do with the price charged for the gas. It is sometimes asked, 'Why should the improvements be paid for by the gas consumers?' The reply is easy and conclusive. The gas consumers do not pay for the improvements; they pay for gas, just as the man who goes into the baker's shop pays for bread. The improvements are paid for by the ratepayers, and it is for them, and for them only, to determine whether the gas profits, which belong to them, shall (as now required by law) continue to be applied for that purpose, or whether such expenses shall be defrayed by means of an improvement-rate, and the gas profits paid to the credit of the city fund and in payment of the general expenses of the Corporation, or applied in any other way that may be deemed more beneficial to the inhabitants. Parliament would no doubt be quite prepared, at the instance of the Corporation, to alter the existing law, and to authorize the appropriation of the gas profits in any way and for any purpose which might be deemed to be most beneficial to the ratepayers. Having shown that the price of gas is altogether unaffected by the amount or the appropriation of the profits, and that, under all circumstances, nothing more nor less than the fair market price ought to be charged, the Town Clerk will shortly refer to the proposal or suggestion made that the expenses, or a portion of the expenses, of the improvements should be defrayed out of, and by means of an improvement-rate. What is meant by this proposal it is difficult to understand. If it is proposed to keep down the price of gas below the market price, and by means of an improvement-rate to obtain the amount of profits which by such a course would, for the benefit of the gas consumers, be sacrificed, there is no doubt that such a course would be both dishonest and illegal. What the imposition of an improvement-rate has to do with the price of gas has yet to be shown. It is quite possible that such rate may, in addition to the gas profits, be required to pay for improvements in progress or contemplated, but the exigencies or requirements of the Corporation in that respect, be they great or small, ought not in any way to affect the price of gas. When it was recently proposed to raise the price of gas 5d. per 1000, or to 3s. 9d. per 1000 feet, as charged in Liverpool (and which price it is said would, considering the present price of coal, be rather below the fair market price), the advance was objected to, and it was suggested that instead of any advance an improvement-rate should be levied. How such a proposal, if carried out, would affect the ratepayers, was clearly shown in a letter from a 'Ratepayer,' which appeared in the Manchester papers, and in which it was stated that 'there are more than 30,000 householders who do not consume more than 4500 cubic feet of gas per annum, which gives (at the additional price of gas of 5d. per 1000 cubic feet) 1s. 10½d. per annum each. An improvement-rate of 4d. in the pound would be necessary to raise the £30,000, and, calculated on the rental of a house at £12 rateable value, would be 4s.;' or, in other words, the 30,000 tenants would, if the advance in the price of gas were not made, and instead (as suggested) an improvement-rate of 4d. only were levied, save 1s. 10½d. in the amount paid for gas, and be called upon to pay an additional 4s. in the shape of an improvement-rate. It appears from the last published report that there are 15,000 gas consumers outside the city, who, it need hardly be said, have no interest whatever in the gas-works, or in the profits made; and it is thus coolly proposed that the ratepayers of Manchester—to whom the gas-works do belong—shall be called upon to pay an improvement-rate in order that such outsiders, who have no interest in the works, may have gas supplied to them below the market price. The position of ratepayers who are also gas consumers within the city only has been referred to. But what would be the position of the ratepayers who do not consume gas? There are within the city 79,600 separate assessments, and only 47,827 gas-meters, or, in other words, there are 30,000 tenements of which the occupants pay rates but do not consume gas. If, therefore, the advocates for low-priced gas and an improvement-rate could have their way, it is obvious that such 30,000 ratepayers, or whatever the number may be, who do not consume gas—to whom, be it remembered, with the ratepayers who are gas consumers, the works and the profits of the works belong—would, in addition to present rates, be called upon to pay an additional improvement-rate, in order that the gas consumers both within and beyond the city might, at their expense, be supplied with gas below the fair market price. From the statements now submitted it will be manifest, when the legal position and the responsibilities of the Council in relation to the gas-works are considered—1. That the Council, as trustees of the property for the whole of the ratepayers, is bound to obtain a reasonable profit or return on the capital employed in the manufacture of gas. 2. That the gas consumers have only the right to require, and the Council are only justified in selling gas at a fair market price. 3. That the imposition or otherwise of an improvement-rate, or the amount or appropriation of the gas profits, has nothing to do with, and ought not in any way to affect the determination of the fair market price which ought to be charged for gas. 4. That there is no pretence whatever for the statement that the gas consumers pay the expenses of the improvements, inasmuch as the profits (at present so employed) belong to the whole of the ratepayers, and in no sense to the gas consumers."

In a note appended to the report the Town Clerk said—

"The only change which has taken place since such report was presented is that the gas-works, which at that time were the property of the ratepayers of the township of Manchester, have been made and are now the property of the ratepayers of the whole city, and that the gas profits are by law applicable no longer to improving only the township of Manchester, but 'in and towards the improvements of the city of Manchester.'"

The report was received, and ordered to be entered on the minutes.

Serious Explosion of Gas at Ilkeston.—Last Tuesday, about dusk, the inhabitants of Cotmanhay Road, Ilkeston, were alarmed by a loud report, caused by an explosion of gas, which had accumulated in a disused sewer. The ground near had given way, by reason of the mining operations carried on beneath; and the main, which has frequently been repaired, was rendered unsound at the joints. About 30 yards of asphalte pavement were blown into the road, several doorsteps and windows broken, and a man who was passing was severely injured. Intelligence was at once sent to the gas-works, and Mr. F. C. Humphrys, the Manager, was soon on the spot with a number of men; but it was some hours before the pathway was restored. The unusual occurrence attracted a large concourse of people.

THE GAS SUPPLY OF STONE.

The Application of the Local Board for a Provisional Order Rejected.

At the Meeting of the Stone Local Board on Monday, the 3rd inst., the Clerk read a letter which had been received from the Local Government Board in reference to the Board's application for a Provisional Order empowering them to erect works to supply gas in competition with the existing Gas Company. The letter was in the following terms:—"I am directed by the Local Government Board to state that they have had under their consideration the report of their Inspector (Captain Hildyard), made after the inquiry held by him with reference to the application of the Stone Local Board for a Provisional Order under the Gas and Water Works Facilities Act. The Board understand that gas is at present supplied to the district by the Stone Gaslight and Coke Company, and that the Local Board have been desirous of purchasing the Company's undertaking. The Company and the Local Board, however, have not been able to come to terms, though it was stated at the inquiry that the former would have been willing that the price should have been settled by arbitration. The Local Board could not acquire the undertaking compulsorily, and, consequently, they could only be empowered to establish separate works. The Board learn, however, that the Gas Company are prepared to apply for parliamentary powers, and also to introduce the oxide of iron process of purification instead of the present lime system. Captain Hildyard reports that in this way all legitimate cause of complaint will be removed. Moreover, the Board think that under ordinary circumstances a local board should provide their districts with works of sewerage and water supply before they set up a gas undertaking, and it appears to them that this course should be followed in the present instance. Having regard, therefore, to the foregoing considerations, the Board are not prepared to issue the Provisional Order applied for."

The report of Captain Hildyard, on which the above-mentioned determination was based, is appended, omitting a few of his preliminary remarks as to population and area:—"The Stone Local Board's case was as follows: They maintained that the price of gas was exorbitant, that the profits made by the Gas Company were unreasonable, that the works were carried on upon an obsolete and wasteful system, that the works as carried on and placed were a nuisance to the town, that it was most desirable that gas-works should be in the hands of the local authorities, and that under these circumstances they had done all in their power to come to terms with the Gas Company, whom they asked either to sell or to obtain statutory powers to so place themselves under statutory control. Failing in these negotiations, the Local Board proposed now to set up their own gas-works, though understanding that the size of the town was not such as to support two gas undertakings. The case of the Local Board failed altogether. The price of gas—4s. 2d. per 1000 feet—is not high for the size and position of the town. The profits of the Company from first to last were proved to be under 10 per cent. per annum. The works, though capable of improvement, are in good working order. Considering the position of the works, close to the main street, the present process of purifying should be altered; but the Local Board actually proposed to take the works in their present position, thus showing that they do not consider this as a serious nuisance. Doubtless it would be better for gas-works to be in the hands of the local authorities, but in the present case, the Local Board, being a newly-formed one, with all its works (sewerage and water supply) before it, I think that these works should first be carried out. As to the negotiations between the two parties, the Gas Company certainly wrote saying they would take a certain sum, £20,000, and that it was useless to offer less; thus, in the opinion of the Local Board, breaking off the negotiations. This letter, however, did not preclude the Local Board from proposing arbitration, and this the Company say they would have been ready to accept. Looking at the size of the town, it is evident that two gas-works cannot be supported, and the proposed action of the Local Board could then only have one of two results—the ruin of the Gas Company, or the amalgamation of the Gas Company with the Local Board. Either of these results would be most undesirable. The Chairman of the Gas Company pledged himself most distinctly that, as far as he knew, he could answer for his Shareholders that they would be ready to go to Parliament for a private Bill in the ensuing session; and, further, that they would be ready to introduce the oxide of iron purification instead of the present lime system. This will, I believe, remove from the town all legitimate cause of complaint. Recommendation: That the Provisional Order be not granted to the Local Board to authorize their constructing and maintaining gas-works."

ULVERSTON LOCAL BOARD GAS AND WATER SUPPLY.

At the last Meeting of the Ulverston Local Board, the Manager of the Gas and Water Works (Mr. John Swan) read his annual report, which was as follows:—

To the Chairman and Members of the Ulverston Local Board.

Gentlemen,—I have pleasure in laying before you the operations of your gas and water works for the year ending March, 1880.

Gas.—Notwithstanding the depression of trade during the last twelve months, there has been a slight increase in the consumption of gas. The quantity of gas manufactured during the year ending March 31, 1880, has been 16,106,200 cubic feet; the quantity made during the year ending March 31, 1879, was 15,752,900 cubic feet, being an increase of 350,300 cubic feet, or 2·2 per cent. The quantity of gas registered by the consumers meters during the year ending March 31, 1880, was 13,149,500 cubic feet; quantity sold for public lighting, 1,911,186 cubic feet; quantity consumed on the works, 161,600 cubic feet—total, 15,222,286 cubic feet. The unaccounted-for gas has been 883,914 cubic feet, or 5½ per cent. as compared with 6¾ per cent. last year. The gas consumed on the works last year was included as leakage, but the amount during the last twelve months has been accounted for, so that the net saving has been ¼ per cent., or 40,265 cubic feet. The average make of gas per ton of coal carbonized during the year has been 10,231 cubic feet, showing an increase of 20 cubic feet over the production of last year.

The future prospects of trade are not yet sufficiently bright to warrant the Board in proceeding with the erection of the proposed new retort-bench, and with an ordinary increase in the consumption of gas the present manufacturing power will be sufficient for another winter. The new exhauster and scrubber continue to do their respective work in the manufacture and purification of the gas very efficiently.

The extra production of gas per ton of coal carbonized has averaged 1027 cubic feet, and the sale of gas per ton has realized as much as was previously manufactured. The quantity of ammoniacal liquor produced during the last twelve months has been 49,000 gallons, as against an average of 29,000 gallons previous to the erection of the scrubber; the extra amount of money realized representing £112 per annum, while the gas has been free from ammonia and carbonic acid.

There is a deficiency of tar and liquor storeage room at the works, and I would recommend the Board to erect a cast-iron tank above the engine and exhauster house, with a pump attached by an eccentric rod to the shaft which drives the machinery of the scrubber. There would be then very little manual pumping required, and consequently the cartage could be done for less money, while the convenience and general appearance of the works would be improved. I estimate the cost of the foregoing at £112.

All the apparatus, buildings, &c., have undergone during the year the usual repairs, and are in good working order and condition. The mains and services are also in good condition, which is borne out by the continued reduction in the unaccounted-for gas.

The illuminating power of the gas during the year has averaged 17·43 candles. The number of street-lamps is 214, six new ones having been added during the year, and are lighted with 120 burners, consuming 5 cubic feet of gas per hour, and 94 consuming 3½ cubic feet per hour. Nearly all the lamps have been fitted up with Peebles's patent needle governors, and the result has been a great improvement upon the lighting of the town. The total number of meters in use is 830. Twenty-eight new consumers have been added during the year, and twenty have ceased to use gas, or have left the town, making a net gain of eight consumers over the previous year.

The total length of mains added during the year has been 137 yards.

Working Statement.

Gas made, as per station-meter		16,106,200 cubic feet.
Gas sold to private consumers	13,149,500 cubic feet.	
Gas sold for public lighting	1,911,186 ,,	
Gas used on the works	161,600 ,,	
		15,222,286 ,,
Unaccounted for (5·5 per cent.)		883,914 cubic feet.
Coal carbonized—common, 1323 tons; cannel, 251 tons		1,574 tons.
Illuminating power required by Act		14·00 candles.
Illuminating power supplied		17·43 ,,
Gas made		16,106,200 cubic feet.
Gas made per ton		10,231 ,,
Gas sold		15,060,686 ,,
Gas sold per ton		9,568 ,,
Gas sold, per cent. on make		93·50 per cent.
Gas used at works		161,600 cubic feet.
Gas used at works, per cent. on make		1·00 per cent.
Gas unaccounted for		883,914 cubic feet.
Gas unaccounted for, per cent. on make		5·50 per cent.
Coke made		985 tons.
Coke used for fuel		592 ,,
Coke used for fuel, per cent. on make		60 per cent.
Tar made		23,400 gallons.
Tar made per ton of coals		15 ,,
Liquor made		49,000 ,,
Liquor made per ton of coals		31 ,,

Water.—During the year there has been a constant supply of water furnished throughout the Board's district, except on one or two occasions, when a temporary inconvenience was occasioned through the bursting of the 9-inch main between Pennington and the filter-bed. The reservoir at Pennington was finished for formally opening on Sept. 3, 1879, and since then the supply of water to Ulverston has been very much improved in quality.

During the year the Committee have had before them the question of meter *versus* gauge, for the purpose of measuring the compensation water to be delivered by the Barrow Corporation to the Board, and after a considerable delay the system of measurement by gauge has been satisfactorily agreed upon between the Barrow Corporation and the Board, the position and construction of the gauge to be carried out as per agreement.

Water has been laid on from the Board's mains to 73 additional premises during the year, and the total number of premises now supplied is 1855. Thirteen extra hydrants have been added during the last twelve months, and the total number of hydrants in efficient order is 116. All the services in Soutergate have been disconnected from the old main, and attached to the new 4-inch main on the opposite side of the street.

The total length of mains laid down during the year has been 1881 yards.

(Signed) John Swan, Manager.

ODESSA WATER-WORKS COMPANY, LIMITED.

The Half-Yearly General Meeting of this Company was held at the City Terminus Hotel, Cannon Street, on Wednesday, the 21st ult.—Sir Francis S. Head, Bart., in the chair.

The Secretary (Mr. Emanuel Allen) having read the notice convening the meeting, the report of the Directors was taken as read.

The Chairman said the first paragraph of the report gave the result of the year's work, and he thought that this result was satisfactory as compared with the previous year. The receipts had been £47,334, as against £39,061 last year, which, of course, was a considerable increase. The expenditure was about the same, but in reality it was £1800 less, consequent on the diminution in the loss by exchange. The surplus of £4021 was, as before, applied in aid of the dividend on the A shares, now making the amount for this purpose over £10,000. The next paragraph referred to the guarantee—the very moderate amount promised by the Municipality of Odessa, under a so-called guarantee. He need hardly remind the Shareholders that the amount guaranteed was 300,000 roubles, which was to be made up if their receipts were below that sum, on the condition that when they exceeded it such amounts should be paid out of the excess, and the report explained to them what the effect of this would be if it were enforced—that they would absolutely, after supplying the town of Odessa for six years without getting one shilling of dividend, stand indebted to that town to the extent of 378,000 roubles for giving them the water for nothing. It was very desirable that this matter should be clearly and broadly put before the Shareholders, the public, and the Russian Government, because the altogether absurd, unjust, and unbearable terms on which this contract was concluded were some of the most monstrous things that could be mentioned and explained them more clearly than he could. The Directors would, of course, try to bring the matter strongly before the Authorities, and, if they had any feeling of justice or sense of right, he hoped the Company would obtain an alteration. He might take this opportunity of saying that while the Municipality were so exceedingly particular about enforcing the terms of their contract as regarded payment, they were constantly pressing the Company to lay down additional mains. They had had an application for a main to be laid seven miles north of Odessa, estimated to cost 90,000 roubles, and at the beginning of last February a threat was made to take legal proceedings to have it carried out. They also wanted the Company to lay another main beyond the concession on the road to Nicolai, and legal proceedings were also threatened in this case. There were also two other new mains situated within the boundary, but the Directors hoped to postpone them for the present, because the work would not pay expenses, and they would do what they could to prevent laying these mains. The other two were of more importance. In one case the Directors had agreed to an extension in the boundary, but the cost would probably only be £350, and the return was likely to be remunerative. On the other hand, with regard to the fulfilment of their own obligations, he was afraid the Municipality were not quite so careful; and the report informed the Shareholders that, with regard to the construction of sewers, which was promised to be effected immediately on the Company's formation, and upon which, in fact, the

whole future of the Company was based, this had never been carried out. The town, as he had told them frequently before, suffered enormously in many respects from the want of these sewers, and they were still very far from completion. At present there were constructed about 31 miles of sewers, of which 4 miles had been completed since the beginning of 1879; but there were still 9 miles to be built of the sewers which were promised to be opened immediately on the completion of the Company's works, and about 31 miles of sewers had also to be constructed in the suburbs and the poor quarters. These were works which the Municipality were bound to perform, and for the neglect of their performance the Company were suffering enormously in their receipts. As soon as the houses were connected with the sewers a very considerable amount of water would have to be taken by each house for flushing and cleansing the sewers. When, however, they were completed, they had no outfall. There were at present only two provisional outfalls, and both were very objectionable and defective. One would have to be removed very shortly, and would involve the Municipality in considerable expense. All these matters were beyond the control of the Board. On the other hand, a certain amount of progress had been made. Some 528 houses had already received authority to make connections with the sewers, and other houses were being daily added to the list; but, after all, the total number of houses supplied with water at all was only 3407, those having received authority to connect with the sewers being only 17 per cent. of this number, and there were still 2000 houses unsupplied with water. If the Company only had something like decent or fair treatment, they would not be in their present position; but, as it was, they must wait, as they had done, till they obtained more justice. He mentioned these things because he did not wish it to be supposed that the Directors were querulously complaining. They were telling the Shareholders the circumstances of the concern being in its present position when it ought to be flourishing. The next paragraph in the report went on to say that the Board had paid off £5800 of debentures during the last year out of the earnings of the Company, and they were still obliged to retain the cash balance at the credit of the dividend account to meet others falling due. That explained their inability to share the small dividend they had earned. They were obliged, in the present condition of the concern, to keep what money they had for dealing with their debentures. If gentlemen who were largely interested as Shareholders would consider the security they offered and the interest they paid, they might see that it would be worth their while to put the Company in a better financial position. This year they had about £15,800 debentures falling due. Of these about £5000 had been renewed, so that about £10,800 had to be paid off, and this would have to be paid off from the only funds at their command—the receipts to which he had referred. The receipts had increased very considerably over last year, owing to the natural requirements of the town, in spite of their disadvantages. He might say that he had the returns of the last three months—January, February, and March—and they showed that the Company's receipts had been 81,932 roubles (say, 82,000 roubles), as against 72,000 roubles in the corresponding months of last year. That was, roughly, something like 15 per cent. increase during the last three months, which showed that the increase was fairly to be expected to continue—in short, it would be very different from the history of other water companies if this were not the case. At that moment, too, they had outstanding claims of one sort or another amounting to about £20,000, including, of course, their claim on the Government for the water supplied to the garrison of Odessa. The report next stated that "the action which for the last four years has been maintained by Messrs. Schwaben and Müller against the Company has at length been decided in the Court of Common Pleas." Perhaps the Shareholders would allow him to say a few words on the nature of this action. In July, 1875, Messrs. Quick, their Engineers, reported to the Board that they were unable to certify to the amount claimed by Mr. Müller, who was the Company's contractor. Of course, that statement was laid before the Board. Almost one of the first things he heard of when he joined the Board was the receipt of a letter on the 1st of September from Mr. Müller's solicitor, threatening an action against the Company, and claiming £65,000. This was followed by a writ, which was served on the Company for £70,000, and on Nov. 29, 1875, the particulars of claim were sent in, amounting to £72,110. The Board discussed the matter, and after much consideration they came to the conclusion that they would resist it. They felt it was a matter which they had better fight, and a very long fight it had been. The case first of all came before Justice Field, but was afterwards referred to an arbitrator. All the accounts were gone into one by one, and the effect of it, after all, was that the referee reported in the Company's favour, and judgment was given in the Court of Common Pleas by Justice Field to the extent described in the report—that Mr. Schwaben had to pay them £14,696, and Mr. Müller £6483, with all costs, the costs amounting to about £2100. Those costs had to be taxed, and when that process was completed they would see what they could recover. He thought, as far as the Board were concerned, that they could take credit for having protected the interests of the Company very effectually. The next paragraph referred to the increasing enlargement and prosperity of Odessa, on which he could only say that the trade of Odessa and everything in Odessa was satisfactory, except the Odessa Water-Works Company. They were all going ahead there, they had the tramway lines down, they were building new railways and tramways, and, in short, they were all very happy; and he ventured to repeat that a great deal of this prosperity was owing to the circumstance that the inhabitants had now what they never had before—an abundant supply of water, which was a thing unknown in the south of Russia. Before the Company's works were in operation, Odessa was subject to absolute dearths of water, and he might say that the people were almost dying of thirst, and had to buy water by the pint. Such a state of things was a great drawback to a commercial place. Water was what the inhabitants wanted, and the Company had supplied it to them, with the result the Shareholders saw. The report went on to speak generally of the affairs of the Russian Government, and upon this point he could say very little just at present, because, among other reasons, it was rather difficult to express the hopes he felt without a certain amount of explanation; but he might say that the policy likely to be pursued by the new Government was sure not to be more unfriendly to Russia than that which had been existing. He need not say that the sort of antagonism which had existed between Russia and England had made it very difficult for a Company like theirs to obtain that attention which he thought under other circumstances they might expect; and if a different feeling should exist hereafter, and Russia should be anxious for the good-will and kind feeling of this country, as he hoped she might be, he need not tell the Shareholders that this would be a very material matter to the concern, and upon it depended the treatment they might expect to receive from the Russian Government. In conclusion, he said he thought that, upon the whole, their position was certainly a good deal better—naturally better than it had been—and that they had fair ground for hope that it would continue to improve; but the unfair grievances under which they had laboured, and still laboured, had not been redressed; and until they were, the Company would never be in that position which water companies in England—in fact, in any other country but Russia—were in, and he hoped that Russia would soon see that she ought not to stand in such an exceptional position. He then moved the adoption of the report and accounts.

Sir Arthur T. F. Clay, Bart., seconded the motion, and it was at once carried unanimously.

The retiring Directors—Messrs. F. Wigan and John Wood—having been re-elected,

A Shareholder asked the amount due for the supply of water to the troops.

The Chairman replied that the amount was £6500, and that a Government order had been given for its payment; but in Russia giving an order and having it executed were two different things. The Government admitted the claim, and he had no doubt the Company would get it; but his feeling was that they ought not to have been kept five years waiting for it. Replying to a further question from the same Shareholder, he said he was afraid he could not say much as to what they would get from Mr. Schwaben, but they would try and get all they could.

The Auditors—Messrs. R. Mackay and Co.—having been re-elected,

Mr. G. A. Northover moved, and Mr. Rayden seconded, a vote of thanks to the Chairman and Directors.

The motion was carried unanimously, and the proceedings terminated.

THE LANCASHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

There is not only no indication of any improvement in the coal trade of this district, but, if anything, all classes of round coal are becoming more difficult to move. Of the better qualities there is considerably less going into consumption for house-fire purposes, and the commoner sorts are not meeting with any better demand for steam and forge purposes, the quantity taken by works being still very limited. There is a good deal of pressure for sales, which naturally has a tendency to weaken prices, and this, with the abundance of round coal in the market, cannot fail to have some effect upon the value of coals for gas-making purposes. For gas coals there have been a fair number of inquiries recently, but these seem to have been sent out more for the purpose of feeling the market, as I do not yet hear of much having been done in the shape of actual business. It is therefore difficult to say what prices sellers will be prepared to take. Judging, however, from the figures generally spoken of in the market, 5s. 9d. to 6s. per ton would seem to be about the price which it is expected good unscreened Lancashire gas coal will fetch at the pit; but at present there is really no fixed price. For best screened Wigan Arley mines not more than about 8s. per ton is being obtained at the pit for anything like quantities, and inferior sorts range as low as 6s. per ton, with Pemberton four-feet fetching about 6s. to 6s. 6d., and common round coals for steam and forge purposes, 5s. to 5s. 6d. per ton; in some cases, where sales are pressed, lower prices even than these being accepted. In the engine coal trade there is generally a firm tone, owing to the small production of slack, some of the colliery proprietors finding it difficult to meet the requirements of their customers; but there does not seem to be quite so much push for this class of fuel as there was a short time back, and for burgy there is still only a moderate demand. The average quoted prices at the pit mouth are about 4s. to 4s. 6d. for good burgy, and 3s. 6d. to 4s. for good slack.

The shipping trade fluctuates a great deal. Last week there were indications of improvement, but this week the demand is again dull, and very low prices are being taken.

For coke there is less demand.

The iron trade is in a very unsatisfactory condition. There is little or no demand for legitimate requirements, and it is only where speculative buyers can obtain deliveries over the year at the lowest prices that transactions are reported. There is a great deal of underselling with iron in second hands, and very low prices are ruling in the market. Lancashire makers of pig iron, although they would take under 55s. per ton, less 2½, for both foundry and forge iron delivered into the Manchester district, are unable to secure orders. Stocks are accumulating at the works, and the Wigan Coal and Iron Company have blown out one of their furnaces for repairs. Hematites are being pressed upon the market by speculators who had bought for the American demand, and good brands are being offered for delivery into this district at about 78s. 4d. per ton, less 2½ per cent. The finished iron trade is very dull, and second-hand holders are offering bars delivered into the Manchester district at as low as £7, plates at £7 10s., hoops at £8, and puddled bars at £4 10s. per ton.

THE YORKSHIRE COAL AND IRON TRADES.

(FROM OUR OWN CORRESPONDENT.)

The coal trade throughout Yorkshire is much depressed, particularly in the southern part of the coal-field, where of late years some of the largest collieries in the country have been sunk, at an enormous cost. There can be no doubt that the output is far too great for the demand, the new undertakings having, with few exceptions, been constructed with appliances capable of raising fully 1000 tons per working day. The house coal trade during the past two months has been very moderate. Coalowners complain that the high tonnage rates charged for carrying coal by rail prevent their competing with other colliery districts who send supplies to London, and a strong agitation is going on for the purpose of inducing the new Government to grant a Commission of Inquiry into the rates charged from Yorkshire as compared with other districts. At some of the largest collieries in South Yorkshire a large tonnage of gas coal is being raised, which is being for the most part supplied by contract to the leading gas-works in Yorkshire, Lincolnshire, and elsewhere.

A very fair tonnage is being sent to the eastern counties. A good deal of interest is being taken with respect to the renewal of several contracts for gas and steam coal which are now in the market. It is stated that the prices at which the last contracts were placed were far too low, and it is known that an understanding has been come to, with a view of not tendering below a certain figure. It is, however, doubtful whether this will be adhered to, owing to the very quiet state of trade and the scarcity of orders. Many of the collieries in the South Yorkshire coal-field possess such tender roofs, and are so liable to sudden outbursts of gas from the coal and floor, that the owners dare not set them down, and this will doubtless greatly influence them.

There is rather more doing in steam coal for exportation from Hull and Grimsby, the leading merchants taking a good tonnage. Daily prices of this, as of nearly all other kinds of fuel, continue low, whilst stocks at some places are accumulating.

The coke trade, although scarcely so brisk as it was a short time ago, may be said to be good. The output of the South Yorkshire district has, during the past four months, been more than doubled. At the present time, long ranges of ovens are being erected or put in repair at many places in the district. At Silkstone Common, where there are already three long rows of ovens at work, a fourth, which has been idle for several years, is undergoing repairs. The Silkstone and Dodworth Coal and Iron Company, Limited, who are noted producers of gas coal, have about 100 ovens in operation, and in a short time they will blow in two

large blast furnaces at Winfield, in Derbyshire, which have recently come into their hands.

The iron trade does not present so inviting an appearance as it did a month or rather more ago. The blast furnaces at Ardsley, Milton, Elsecar, Thorncliffe, and elsewhere in the district, are kept fully going, but prices continue much easier than they were. The general foundries which for the most part are dependent on colliery work, are not over well off for orders; but at Thorncliffe, where a good business is usually done in gas and water-pipes, moulders and kindred workmen have no cause to complain.

THE COAL AND GENERAL TRADES OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of the Tyne begins to show more activity with the advent of the month of May. The shipments of gas coals to the Mediterranean and Baltic are very considerable. Some large contracts were made some time ago to supply Cronstadt and Moscow with gas coals. These contracts have been commenced with. There are fair inquiries, too, in the open market for gas coals for shipment. The exports have been larger this week than for some time past. Prices are unchanged. In the early part of last week the finished iron trade of the county of Durham was thrown into considerable confusion through the men striking against a reduction of 5 per cent. upon their wages, which had been made through the operation of the sliding scale. In consequence of the sudden stoppage of an important branch of local trade, coke, which is largely supplied to the iron furnaces, fell in price; but the dispute was settled by the end of the week, and coke gave signs of an improvement in prices on Saturday. Other branches of the coal trade are unchanged. A little more business has come to the steam coal trade; but coalowners continue to experience a difficulty in maintaining prices. The demand from the Baltic for coal is much below an average for the season of the year. It is very disappointing to the trade here.

The freight market is still very dull. Coasting rates are rather down than otherwise. There is scarcely any coasting business offering. Steamers are taking cargoes of coals to London at 3s. 11½d. per ton. The Channel rates for sailing ships show a fall of about 3d. per ton.

The general manufacturing trade of the Tyne and other northern rivers is quiet. The chemical business was somewhat better last week, but it showed no substantial improvement in prices. Shipments, however, are somewhat better. The exportation of fire-bricks is as good as ever. The oversea shipments are large and pretty general. The tone of business in the North of England iron markets is stronger. Prices are firmer in Middlesbrough. No. 3 foundry iron was sold at 40s., whereas the previous week it was 37s. Copper, however, was easier to sell. The price of lead has suffered to the extent of 10s. per ton. Quotations are now about £16 a ton. Spelter is in moderate demand. There are pretty good shipments of cement; but this branch of northern industry is not strong.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

At the monthly meeting of the Dundee Gas Commissioners, held last Wednesday, it was reported that 341 million cubic feet of gas had been manufactured during the year just closed, being 15 million feet more than the estimated quantity, and an increase of 18 million feet as compared with the make of the preceding year. Favourable contracts for the supply of coal during the current year having already been entered into, it is understood that the present low price of gas will be maintained.

For a long time the price of gas at Kennaway, in Fifeshire, has ruled at 10s. per 1000 cubic feet, a price which has been complained of by many persons, and has been the means of causing a number to use paraffin oil and other modes of lighting instead of gas. On Monday, the 10th inst., the Directors of the Gas Company agreed to a proposal to reduce the price 1d. per 100 feet, or to 9s. 2d. per 1000, hoping thereby to encourage more of the inhabitants to use gas instead of oil, and thus prove advantageous both to consumers and the holders of gas shares.

The new gas-works at Thurso are being rapidly pushed forward, so as to be ready for the supply of the town by the 1st of October. The Gas Company are determined not only to supply the immediate wants, but also to make ample provision for the future extension of the town for many years to come.

At the annual meeting of the Gas Company of Innerleithen, in Peeblesshire, which was held last Thursday, a dividend of 8 per cent. was declared, and a small balance was carried to the reserve-fund. The price of gas is 5s. 10d. per 1000 cubic feet, the illuminating power being from 28 to 29 candles.

The annual general meeting of the Kilsyth Gaslight Company was held last Tuesday—Bailie Brown presiding. The Auditors report for the year was submitted and approved of. It showed that the affairs of the Company were in a favourable condition; for, notwithstanding the large amount paid for renewal of pipes and plant throughout the past year, the Directors were still able to recommend a dividend of 5 per cent., while carrying forward a considerable balance to the depreciation of plant account. It was resolved to approve of the recommendation, and to continue the price of gas at 5s. 5d. per 1000 cubic feet. Preparations are being made for the further extension of the works.

A special meeting of the Milngavie Burgh Commissioners was held last Thursday—Provost Macaulay in the chair—when Bailie Strathdee reported that he had received no definite answer from the Partick, Hillhead, and Maryhill Gas Company as to what they were willing to do in the way of furnishing a supply of gas for the burgh, but that their Manager, Mr. James Hislop, said his Company could supply gas to Milngavie at 4s. 7d. per 1000 cubic feet. It was stated that the cost of laying a pipe from Canniesburn to Milngavie would be about £2000. The Clerk was directed to invite the Proprietors of the different public works in the district to a conference on the subject.

Business was done last Wednesday in the Glasgow Corporation 6¾ per cent. Gas Annuities at £161 10s.

There is still a feeling in Perth that much, if not all of the present unusual sickness in the city is due to the contamination of the water, caused by carelessness in some of the work connected with the new supply, and Dr. Wallace's report has not removed this impression. Workmen were on Friday engaged in excavating the roadway between the water-house and the Tay, for the purpose of ascertaining if there was any flaw in the joining of the pipes leading from the filter-bed to the water-house, and if by any possible means contaminated water could find an entrance into the supply-pipes. Mr. Bateman will arrive in Perth on Tuesday (to-day) for the purpose of making a final examination of the works connected with the new water scheme. The whole of the works are now in such a forward condition that the new water supply can be turned on at Whitsunday, if the Water Commissioners are agreeable.

A meeting of the Dundee Water Commissioners was held last Thursday—Provost Brownlie in the chair—when the subject of an interim water supply for Newport was considered. It may be remembered that the Commissioners were sending a supply of Lintrathen water to that transpontine suburb of Dundee by way of the Tay Bridge, and that the supply was suddenly cut off by the dreadful disaster which happened to that structure on the 28th of December last. An application was presented to the Commissioners by the Local Authority of Newport, requesting them to supply Newport with water from the Wormit stream for £253 beyond the sum of 6d. per 1000 gallons, which was the rate charged for the Lintrathen water. Several of the members objected to the proposal on the ground that it was illegal, and that the sum to be paid by Newport would not pay the cost; while, on the other hand, it was set forth that if the Dundee Water Commission did not supply the water to Newport, the Local Authority there might take up the matter itself, and refuse the Lintrathen water supply when the bridge was re-erected. On a division, the proposal was carried by a large majority. At the same meeting of the Commissioners the Engineer reported that the average daily consumption of water for the month ending the 26th of April was computed to be 5,513,000 gallons, being a decrease of 266,657 gallons.

Estimates for the new drainage works for the town of Annan have just been received, ranging from £2401 to upwards of £5000. The two lowest were within 2s. 7d. of each other. They were remitted to Mr. Barbour, C.E., Dumfries, to report upon.

The Town Council of Wick held a special meeting last Thursday, to consider a complaint from the Board of Supervision regarding the defective drainage of the town. A reply was adopted by the Council, denying the allegations on which the complaint was founded.

Last week's Glasgow pig iron market was dull and comparatively inactive, and latterly it assumed quite a languid tone, neither buyers nor sellers showing much desire to operate. Only a moderate amount of business was done. The market closed on Friday with buyers at 46s. 7½d. cash, and 46s. 9d. one month; and sellers 1½d. per ton higher.

The coal market is exceedingly dull. Both prices and wages are undergoing reductions.

REDUCTION IN THE PRICE OF GAS AT ILKESTON.—The Ilkeston Local Board, the owners of the gas-works supplying the district, have just reduced the price charged for gas. The scale of price varies according to consumption. The charge to the small consumers has been lowered from 4s. 2d. to 3s. 9d. per 1000 feet, with ½d. in the shilling discount for cash payments; while the price for the largest consumers has been reduced from 3s. 8d. to 3s. 3d. per 1000 feet.

INSTITUTION OF CIVIL ENGINEERS.—At the meeting of the Institution last Tuesday, Mr. George Seaton, Engineer-in-Chief to the East London Water-Works Company, was elected a Member; and Messrs. Robert Ormiston Paterson, Engineer to the Cheltenham Gas Company, John Charles Mackay, of the Port Elizabeth Water-Works, and Matthew Wilson Hervey of the West Middlesex Water-Works, Associate Members.

EAST RETFORD WATER SUPPLY.—At the meeting of the East Retford Town Council on the 30th ult.—the Mayor (Alderman Wilkinson) in the chair—the Town Clerk read a letter from the Local Government Board sanctioning the borrowing, on the security of the rates, of £15,000 for water-works purposes, and stating that a recommendation had been made by them to the Public Works Loan Commissioners to lend the money at 3¾ per cent., to be repayable in a period not exceeding 30 years. It was resolved to accept the terms proposed by the Commissioners.

UCKFIELD GAS COMPANY.—The annual meeting of this Company was held on Thursday, the 29th ult., when the report which was presented by the Directors was adopted, and the dividend recommended was declared. The gas-rental for the past year was only £882 3s. 3d., as against £914 15s. 7d. in 1878-79, owing to the reduction in the price of gas to 5s. 10d. per 1000 feet. The receipts for coke and tar were £139 4s. 9d., which was about the same as the previous year. The assets and liabilities account showed a balance of £790 6s. 8¼d. available for dividend and reserve, and of this sum the Directors proposed to appropriate £200 in payment of a dividend at 10 per cent., and to retain the balance for working capital and reserve. The balance-sheet showed that the gross receipts from all sources for the year were £1116 19s. 10¼d., while the payments were — For coals, £409 3s. 8d.; for meters and services, £46 0s. 7d.; salaries, £95 9s. 2d.; wages and labour, £124 4s. 9d.; sundries, £52 1s. 4d.; dividend last year, £200; the remaining items being balances in hand and at the bankers.

SHOREHAM WATER-WORKS COMPANY.—The half-yearly general meeting of this Company was held on the 24th ult., when the report of the Directors for the half year ending Dec. 31, 1879, was presented. It stated that the Company's gross income for the period reported upon was £630, and that after paying out of this amount the ordinary working expenses, there was left a balance of £358 divisible among the Shareholders. The Directors recommended the payment of a dividend of 2½ per cent., which with the interim dividend paid in October last would make 5 per cent. for the year, leaving a balance of £170 to be dealt with by the Shareholders. Of this sum it was advised that £100 should be carried to the reserve-fund, and the remainder to the next account. To meet the requirements of the Company's district the Directors recommended the construction of two reservoirs, each capable of holding 75,000 gallons of water, instead of the single reservoir previously sanctioned by the Shareholders. The report was adopted, the retiring Directors and Auditor were re-elected, and the proceedings closed with the customary vote of thanks to the Chairman.

STAFFORD CORPORATION GAS SUPPLY.—The quarterly meeting of the Stafford Town Council was held last Tuesday, when the Gas Committee reported that, during the year ending March 31, 66,762,000 cubic feet of gas had been made and 61,385,000 feet sold. Reductions in the price of gas and of coke had caused a decrease in the receipt for gas to the amount of £504 4s. 4d., and in that of coke to £167 8s. The gross profits for the twelve months amounted to £5413 7s. 9d., and, after paying interest due on the loans and income-tax, there remained a net balance of £2056 19s. 4d. The sum of £1500 had been paid over to the general district fund towards the reduction of rates, and the balance at the credit of the net revenue account would enable the Committee to hand over a similar sum this year; and this they recommended should be done. Alderman Cox, in moving the adoption of the report, said the proposed transfer of £1500 to the district fund account would leave the Committee £1318 in their working account, and in making the payment he thought they should congratulate themselves upon their excellent Manager (Mr. John Storer), for without good management it would be impossible to effect the saving of so large a sum.

TOTNES GAS COMPANY.—The annual meeting of this Company was held on Monday last week—Mr. J. W. Chaster in the chair. The statement of accounts and the report of the Directors for the past year showed that after providing out of profits for interest on the preference shares, £500 of which were paid off at Michaelmas last (taken from the reserve-fund), there remained £820, out of which they recommended a dividend at the rate of 7½ per cent. per annum, free of income-tax, on the ordinary shares. This would absorb £375, leaving a balance of £445, of which they proposed to carry £200 to the reserve-fund and the remainder to the next account. The Directors stated that Mr. John Shute, who had filled the office of

Manager for many years in a most efficient and satisfactory manner, had been compelled from failing health to relinquish his duties, but they had secured the services of Mr. Samuel Samuel, late of the Dowlais Gas-Works, who had had many years experience, and whom they believed fully competent to undertake the duties. They recommended that the price of gas be reduced from 5s. 5d. to 5s. per 1000 feet, from the 25th of March. The report was adopted, and a resolution expressing regret at the resignation of the late Manager, and high appreciation of his 40 years service to this and the previous Company, was put on record.

THE SCOTCH GAS COAL TRADE.—The season for purchasing Scotch cannel coal has just commenced for next winter's gas production, and several gas companies or corporations have either made their purchases or are in the market with their orders. The question as to how prices are to go is altogether an open one, for while on the one hand the momentary depression in the iron trade, as also in the demand for ordinary coals, is in favour of the buyers, still the important fact must not be overlooked that during the past winter and in the preceding autumn there was a very unsettled condition of things amongst the Scotch miners, more particularly in Lanarkshire and the adjoining counties, where there is the greatest prevalence of seams of cannel coal. The unsettledness referred to had the effect of very materially reducing the output, and the consequence of this is that in many cases the stocks which remained at the collieries have been quite cleared out. We understand that in the Motherwell, Wishaw, and Larkhall districts there has been almost a complete clearance. Then, again, at most of the collieries where cannel is worked in the Baillieston district—that from which a large portion of the supply is drafted for the Glasgow Corporation Gas-Works—the "bings" have been very considerably reduced of late. Indeed, it is affirmed on many hands that the stocks of cannel coal in hand have not been so small for many months back, if not even for several years, as they are just now; and some anxiety is already entertained as to whether the available supply for next winter will not be so much lessened by reason of reduced stocks and diminished output as to cause very serious inconvenience to the gas companies and corporations. It is reported that the Dundee Gas Commissioners are already out of the market, having made their purchases for the ensuing season on very favourable terms. One large ship, the *Greenock*, has just cleared out from the Clyde with a shipment of about 1800 tons of Scotch gas coal for Rio de Janeiro.

Register of Patents.

APPLICATIONS FOR LETTERS PATENT.

1636.—CHIDLEY, J., Cutsdean, Worcester, "An improved apparatus for receiving and discharging water." April 21, 1880.
1653.—BEECHEY, C. G., Nottingham, "Improvements in engines worked by gas and air or other hydrocarbons." April 22, 1880.
1661.—BECKTON, J. G., Middlesborough-on-Tees, York, "Improvements in the distillation of coal and other substances, the manufacture of coke, charcoal, and 'patent fuel,' utilizing the gases therefrom, and in apparatus employed therein." April 22, 1880.
1662.—HARTLEY, F. W., Wandsworth Road, London, "Improvements in gas cooking apparatus." April 22, 1880.
1683.—MATHEW, T. C., Camden Town, London, "Improvements in water-waste preventers." April 24, 1880.
1692.—WILLIAMS, H. and MALAM, J., Southport, Lancs, "Improvements in and relating to atmospheric air and gas motor engines." April 24, 1880.
1713.—WHITEHEAD, J., Lockwood, York, "Improvements in unions for joining pipes." April 27, 1880.
1736.—SOMBART, C. M., Magdeburg, Germany, "Improvements in gas-engines." April 28, 1880.
1745.—MESSENGER, T. G., Loughborough, Leicester, "Improvements in apparatus for regulating the supply of water to water-closets and lavatories and other situations where intermittent supplies are required." April 28, 1880.
1753.—BOWDEN, S., Southampton Buildings, London, "Improvements in aspirators or exhausters." A communication. April 29, 1880.
1792.—M'FARLANE, J., Glasgow, "A new or improved construction of water-motor, also applicable as a water-meter." Partly a communication. May 1, 1880.
1854.—SUGG, W. T., Westminster, "Improvements in gas-regulators." May 6, 1880.

PATENTS WHICH HAVE PASSED THE GREAT SEAL.

4414.—HERON, T. Manchester, "Improvements in gas-burners." Oct. 29, 1879.
4501.—ROBSON, J., North Shields, Northumberland, "Improvements in gas-engines." Nov. 4, 1879.
4577.—THORP, T., Whitefield, and TASKER, R., Prestwich, Lancs, "Improvements in apparatus for regulating the supply of gas to burners." Nov. 11, 1879.
4755.—FOULIS, W., Glasgow, "Improvements in gas-engines." Nov. 21, 1879.
4968.—SAMPSON, J., Liskeard, Cornwall, "Improvements in apparatus for preventing waste of water from cisterns and other sources, and for preventing the contamination or impregnation of water supply with foul air or gases." Dec. 4, 1879.
109.—KIDD, J., Saint Bride Street, London, "Improvements in apparatus for carburetting illuminating gas." Jan. 10, 1880.
463.—BUDENBERG, A., Manchester, "Improvements in apparatus for lifting and forcing water and other fluids." A communication. Feb. 3, 1880.
521.—HULETT, D., High Holborn, London, "Improvements in or applicable to apparatus for condensing, washing, and purifying gas and other vapours." Feb. 6, 1880.
545.—WALKER, C. C., Lilleshall, Salop, and WALKER, W. T., Highgate, London, "Improvements in or connected with the purification of coal gas, and in the apparatus employed therein." Feb. 7, 1880.
569.—ATTRILL, H. Y., and FARMER, W., New York, U.S.A., "Improvements in the manufacture of gas for heating and illuminating purposes, and in the means and apparatus connected therewith." Feb. 10, 1880.
601.—ADAMS, J., Glasgow, "Improvements in gas-stoves." Feb. 11, 1880.
728.—CHANDLER, S. and J., Newington Causeway, London, "Improvements in gas apparatus." Feb. 18, 1880.

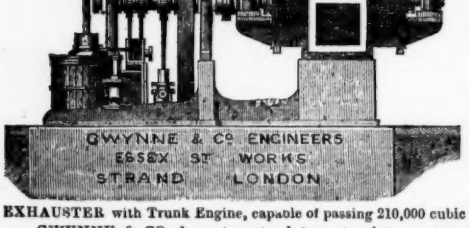
PATENTS WHICH HAVE BECOME VOID

BY REASON OF THE NON-PAYMENT OF THE ADDITIONAL STAMP DUTY OF £50 BEFORE THE EXPIRATION OF THE THIRD YEAR.

1470.—LINFORD, C., "Improvements connected with gas-engines." April 14, 1877.
1527.—HAY, R., and LONGLEY, J., "Improvements in the utilization of small coal for the manufacture of coke." April 19, 1877.
1533.—LAKE, W. R., "Improved apparatus for lighting and extinguishing gas." April 19, 1877.
1592.—NEWTON, J., "Improvements in apparatus for regulating the supply of gas to gas-burners for street-lamps and other purposes." April 24, 1877.
1626.—PEEBLES, D. B., "Improvements in apparatus for governing or otherwise acting on the flow or pressure of illuminating and other gases or vapours, and in part relating to the testing of gas and gas apparatus." April 26, 1877.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION, TWO MEDALS at the PHILADELPHIA EXHIBITION and TWO MEDALS at the PARIS EXHIBITION, have been AWARDED to GWYNNE & CO. for GAS-EXHAUSTERS, ENGINES, and PUMPS; Also 27 OTHER MEDALS AWARDED at all the GREAT INTERNATIONAL EXHIBITIONS.

GWYNNE & BEALE'S PATENT GAS-EXHAUSTERS & ENGINES.



EXHAUSTER with Trunk Engine, capable of passing 210,000 cubic feet per hour.

The Judges report on the combined Exhauster and Steam-Engine exhibited at the Philadelphia Exhibition is—"*Reliable compact Machine, well adapted for the purpose intended, of excellent workmanship.*"

GWYNNE & CO. have made the largest and most perfect Gas-Exhausting Machinery in the world, and have completed Exhausters to the extent of 8,000,000 cubic feet passed per hour, of all sizes from 2000 to 210,000 cubic feet per hour.

52,500 EXHAUSTER, with Horizontal Engine combined.

GWYNNE & CO. do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, *but to produce machinery of the very highest quality, and most approved design and workmanship.* The result is that in every instance their work is giving the fullest satisfaction. Numerous testimonials and references can be given to Companies using their Machinery for years past.

Exhausters, with or without Engines combined, can be made to pass the gas WITHOUT OSCILLATION OR VARIATION IN PRESSURE Regulators, Bye-Passes, Stop-Valves, Gas-Valves, Station Governors, and Gas Machinery of all Sizes.

PLEASE ADDRESS IN FULL, GWYNNE & CO., Hydraulic and Gas Engineers, ESSEX STREET WORKS, VICTORIA EMBANKMENT, LONDON, W.C., ENGLAND.

Gwynne & Co.'s New Catalogue on Gas-Exhausting and other Machinery may be obtained on application at the above Address.

Now Ready, Price One Guinea,

PRECEDENTS IN PRIVATE BILL LEGISLATION

AFFECTING GAS AND WATER UNDERTAKINGS.

COMPILED BY MR. G. W. STEVENSON, C.E., F.G.S.

LONDON: WALTER KING, 11, BOLT COURT, FLEET STREET, E.C.

WANTED, Readers of the NEW Edition, "Cooking & Heating by Gas;" on Burners, &c. Copies, by post, Threepence, direct from the Author, MAGNUS OHREN, Assoc.M.I.C.E., Gas-Works, SYDENHAM.

WANTED, by a young Man, Employment in large Gas-Works. Understands indoor and outdoor work. Fair draughtsman. Excellent references. Seven years experience in provincial Works.
Address No. 658, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Young Man (married), a Situation as MAIN and SERVICE LAYER. Is used to Gas-Works. Can Fix and Read Indexes of Meters. Is the son of a Manager, and has had some experience in an Engineer's shop, both at Lathe and Vice. Very steady.
Apply to the MANAGER, Gas-Works, Crayford, KENT.

WANTED, a Situation as Manager of small or Foreman of large Works, or Retort-Setter, or for the Erection of Works at home or abroad. Holds first-class testimonials for a thorough practical knowledge of the same in all its branches.
Address G. A. S., 18, Sturgeon Road, Surrey Gardens Estate, Walworth, LONDON.

TO GAS COMPANIES AND OWNERS OF GAS-WORKS.

THE Advertiser offers his Services as MANAGER or Manager and Secretary of small, or Assistant in large Works. Having had several years experience (two years as Manager of a Works making 20 millions), is well acquainted with every detail of Manufacture, Office Work, &c. Unexceptionable references as to character and ability.
Address No. 656, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WORKING MANAGER Wanted by the Bourne Gas and Coke Company. Wages 26s. per week, with house, coals, and gas free.
Applications to be addressed to Mr. G. E. STEVENSON, Engineer, Gas-Works, PETERBOROUGH.

WANTED, for a large Provincial Gas-Works, a practical Man, accustomed to Laying Mains and Connections both in and outside the Works. A permanent situation to a sober and competent man.
Apply, by letter, stating wages required, age, present employment, and sizes of mains which the applicant has laid, addressed No. 659, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

SMALL Gas-Works for Sale in the Mid-land Counties, close to Midland Main Line.
Applications for particulars and inspection invited.
Address No. 657, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS PLANT FOR SALE.

THE Maidstone Gas Company having enlarged their Works, offer the following Apparatus for Sale in good condition:—
SCRUBBERS.—One Tower Scrubber 30 ft. high by 10 ft. diameter, with Distributor, and partly fitted with Livesey's boards.
CONDENSERS.—One Set of Annular Condensers, consisting of 9 Pipes 17 ft. high, outer diameter 2 ft. 6 in., fitted with 12-in. Valves complete.
ENGINES.—Two 12-Horse Power Horizontal Engines in very good condition.
STATION-METERS.—One Station-Meter, with Valves and Bye-pass for 20,000 per hour, in ornamental case (Milne); one Station-Meter, with Valves and Bye-pass for 6000 per hour, in cylindrical case.
HYDRAULIC MAIN.—Six 8 ft. by 18 in. Hydraulic Main D wrought iron; 24 8 ft. 9 in. by 18 in. Hydraulic Main D wrought iron. Nearly new.
BRIDGE AND ASCENSION PIPES.—90 6 in. by 4 in. Bridge-Pipes, and a quantity of 6-in. Ascension-Pipes and Bends.
For further particulars and price apply to
JOHN WEST, Engineer and Manager.
Gas Works, Maidstone, April 21, 1880.

FOR SALE—A Second-hand Square STATION-METER, to pass 40,000 cubic feet per hour. Erected about 12 years. Made by Messrs. J. and J. Braddock, Oldham. Now in use at the Plymouth Gas-Works. To be removed to make place for a larger sized Meter. To be sold a bargain.
For price and particulars apply to W. W. ANDREWS, 238, Kingsland Road, LONDON.

GAS PLANT FOR SALE.

THE Coventry Gas Company have for SALE—
SCRUBBERS.—One 5 ft. 6 in. diameter, 20 ft. high. One 5 ft. 6 in. diameter, 15 ft. high. One 5 ft. diameter, 20 ft. high; with or without 8-in. Connections and Valves.
GASHOLDER.—One Telescopic, 40 ft. diameter and 34 ft. high, in two lifts; Cast-iron Tank for same, 41 ft. 6 in. diameter, 18 ft. high.
STEAM-JET VENTILATOR.—One No. 2 Körting's Patent Jet Ventilator, with Chest. One No. 3½ Körting's Patent Jet Blower.
VALVE.—One 12-in. Cathels's Four-way Valve.
The above are being replaced by larger apparatus, and can be removed at once. Also a 100-light Gas Apparatus (Porter's make); this includes a Gasholder, 14 ft. diameter and 10 ft. high, which could be sold separately.
For particulars and prices apply to
W. L. ROBINSON, Manager.
Gas-Works, Coventry, April 17, 1880.

TAR FOR SALE.

THE Directors of the Dronfield Gaslight and Coke Company are open to receive TENDERS for the Purchase of the Surplus TAR produced at their Works for Six months from July 1, 1880.
Tenders, stating price per ton at the Works, or delivered in casks at Dronfield Railway Station, to be sent to the undersigned not later than the 31st inst.
The Directors do not bind themselves to accept the highest or any tender.
C. THORPE, Secretary.
Chesterfield, May 6, 1880.

THREE SECOND-HAND PURIFIERS FOR SALE.

THE Richmond (Surrey) Gas Company have for Sale Three PURIFIERS, 12 ft. by 12 ft. by 3 ft. 6 in., which have been taken down to make room for larger ones. They are in good condition, and will be sold cheap.
All particulars may be obtained from the undersigned,
JAMES ELDRIDGE, Engineer, &c.

THE Sheffield United Gaslight Company OFFER for SALE the following lots of Retort-House FITTINGS, which they are now taking down at two of their Stations:—

54	Pieces Cast-Iron Hydraulic Main, U-shaped, 9 ft. 6 in. by 18 in. by 18 in.
16	Pieces Cast-Iron Hydraulic Main, U-shaped, 9 ft. 6 in. by 18 in. by 15 in.
4	Pieces Cast-Iron Hydraulic Main, U-shaped, 9 ft. 6 in. by 16 in. by 15 in.
320	Cast-Iron Mouthpieces, D-shaped, 21 in. by 15 in.
160	Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 7 ft. 6 in. long.
215	Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 5 ft. 6 in. long.
50	Lengths 4-in. Cast-Iron Ascension-Pipes, curved, 5 ft. 6 in. long.
60	Lengths 4-in. Cast-Iron Ascension-Pipes, curved, 2 ft. 8 in.
37	Lengths 4-in. Cast-Iron Ascension-Pipes, curved, 10 ft. 2 in.
40	Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 5 ft. 10 in.
17	Lengths 4-in. Cast-Iron Ascension-Pipes, straight, 5 ft. 5 in.
481	Lengths 4-in. Cast-Iron H-Pipes.
506	Lengths 4-in. Cast-Iron Dip-Pipes.

The above apparatus has been in use up to a recent date, and is adapted for re-erection.
The Company will be prepared to receive an offer for the whole or any portion of the above. Price £4 per ton, loaded into trucks at Sheffield.
Applications to be addressed to the undersigned.
THOS. ROBERTS, Manager.
Gas Office, Sheffield, March 25, 1880.

THE Gloucester Gas Company, ceasing to manufacture gas at their old works, will have the undermentioned APPARATUS for Sale about the beginning of August, viz.:—
About 150 feet of D-shape Wrought-Iron Hydraulic Main, size 19 in. by 19 in. Also about 38 ft. of D-shaped Wrought-Iron Hydraulic Main, size 20 in. by 20 in. Annular Condenser, consisting of six Vertical Pipes, 24 in. diameter, 19 ft. high, with three 12-in. Slide-Valves and 12-in. Connections.
Scrubber (round), 5 ft. by 20 ft., with three 12-in. Slide-Valves, and 12-in. Connections.
Exhauster (Jones) to pass about 15,000 feet per hour.
Exhauster (Beales) to pass about 25,000 feet per hour.
Two Vertical Steam-Engines, each about 6-horse power, with Pulleys, and Shafting used for driving the above.
Boiler 14 ft. 6 in. by 3 ft. 6 in., with Centre Tube, and four Galloway Patent Tubes.
4-horse power Horizontal Steam-Engine.
Three 4-in. Pumps, with cranked Shafting and a pair of Mitre Wheels.
Two Purifiers, 16 ft. by 8 ft., with six 12-in. Slide-Valves and 12-in. Connections.
Station-Meter by A. Wright and Co., London, with three 12-in. Slide-Valves, and 12-in. Bye-Pass and Connections, to pass about 25,000 feet per hour.
Gasholder, Double Lift, with Cast-Iron Tank, capacity 37,000 feet.
Gasholder, Double Lift, capacity 100,000 feet.
Gasholder, Double Lift, capacity 240,000 feet.
One 12-in. Governor, by Wright, London, with 12-in. Valves, Bye-Pass, and Connections.
Two 12-in. four-way faced Valves, by Cockey.
For further information, &c., apply to the undersigned.
R. MORLAND, Engineer.

BOROUGH OF OLDHAM.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for the AMMONIACAL LIQUOR produced at their different Gas Stations for the period of One or more years, commencing the 1st of July next.
Particulars can be obtained on application to Mr. Herbert Andrew, Gas Offices, Oldham.
Tenders to be sent in on or before Tuesday, May 18, 1880.
By order,
H. BOOTH, Town Clerk.
Oldham, May 3, 1880.

BOROUGH OF OLDHAM.

TO MANUFACTURING CHEMISTS AND OTHERS.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for the TAR produced at their different Gas Stations for the period of One or more years, commencing the 1st of July next.
Particulars can be obtained on application to Mr. Herbert Andrew, Gas Offices, Oldham.
Tenders to be sent in on or before Tuesday, May 18, 1880.
H. BOOTH, Town Clerk.
Oldham, May 3, 1880.

BOROUGH OF OLDHAM.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Oldham Corporation Gas-Works Committee are prepared to receive TENDERS for a Supply of about 40,000 tons of CANNEL and COAL.
Specification and forms of tender can be obtained on application to Mr. Herbert Andrew, Gas Offices, Oldham.
Tenders to be sent in on or before Tuesday, May 18, 1880.
By order,
H. BOOTH, Town Clerk.
Oldham, May 3, 1880.

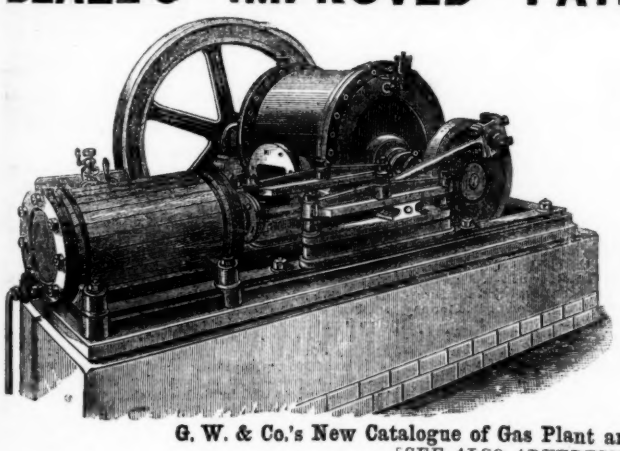
ELLAND-CUM-GREETLAND GAS COMPANY.

THE Directors of this Company are pre-pared to receive TENDERS for the Surplus TAR produced on their Works for One, Two, or Three years from the 21st day of November next.
The Directors do not bind themselves to accept the highest or any tender.
Tenders to be sent to the undersigned (from whom, in the meantime, any particulars may be obtained) not later than 10 a.m., on Friday, the 21st inst.
W. A. WALKER, Secretary and Manager.

BEALE'S IMPROVED PATENT GAS EXHAUSTERS,

WITH

Wrought-Iron Spindles and ENGINES COMBINED.



SOLE MAKERS,

GEORGE WALLER & CO.

MAKERS OF ENGINES, EXHAUSTERS, INDEX AND DISC GAS-VALVES, HYDRAULIC MAIN VALVES, BYE-PASS VALVES, TAR, LIQUOR, AND OTHER PUMPS, SCRUBBERS AND PURIFIERS, CONDENSERS, BOILERS, &c.

G. W. & Co.'s New Catalogue of Gas Plant and Machinery can be had on application.

[*SEE ALSO ADVERTISEMENT, PAGE* 734.]

Phœnix Engineering Works:

HOLLAND STREET, SOUTHWARK, S.E.

LONDON WATER SUPPLY.

A Public Conference to discuss this subject will be held by the Society of Arts on Monday, the 24th inst., and succeeding days.

As soon as the arrangements are complete, they will be published.

Programmes, as soon as ready, can be had on application to the Secretary, Society of Arts, Adelphi, London, W.C.

By order,
H. TRUEMAN WOOD, Secretary.
Society's House, Adelphi, W.C.

WANTED, Specifications and Tenders for the Making and Fixing of Four 14 ft. square PURIFIERS, for the Leyland and Farington Gas Company.

Particulars can be had upon application to CHARLES ELLIOTT, Secretary, Gas-Works, Leyland, near PRESTON.

TO CHEMICAL MANUFACTURERS.

THE Gas-Works Committee of the Keighley Local Board of Health invite TENDERS for the Purchase of the TAR and AMMONIACAL LIQUOR produced at their Works from the 1st of July next to June 30, 1881.

Particulars and forms of tender can be obtained on application to the undersigned, to whom tenders must be sent not later than Monday, the 24th inst.

By order,
J. LAYCOCK.
Low Bridge, Keighley, May 6, 1880.

TO LIME MERCHANTS.

THE Directors of the Loughborough Gas Company will be glad to receive TENDERS for Supplying good Hand-Picked LIME, for Purifying purposes, for One, Two, or Three years, to be delivered at the Loughborough Railway Station, carriage paid. The quantity used per year is about 180 tons. The Lime must be well burnt and free from stone. The delivery to be from time to time as the Manager shall direct, commencing from the 1st of July.

Tenders to be addressed to me, and delivered by the 20th of the present month.

J. B. BALL, A.I.C.E., Manager.

TO MANUFACTURING CHEMISTS.

THE Directors of the Loughborough Gas Company invite TENDERS for the Purchase of the Surplus TAR and AMMONIACAL LIQUOR produced at their Works for One, Two, or Three years, from the 1st of July next. The quantity of Tar made per year is about 180 tons, and about 320 tons of Ammonia Water. Both residuals will be delivered into Contractor's boats at the expense of the Company.

Terms and conditions of the contract may be obtained of the undersigned.

Tenders to be addressed to the Manager, and delivered by the 20th of the present month.

J. B. BALL, A.I.C.E., Manager.

COAL TENDER.

THE Directors of the Loughborough Gas Company are prepared to receive TENDERS for One, Two, or Three years for 4000 tons per year, of good, well-screened GAS COALS, to be delivered at the Loughborough Railway Station, or Canal Wharf, which is 300 yards from Works, carriage paid, and forwarded in the following monthly quantities, viz.:—

1880, July	200	tons.
,, August	200	,,
,, September	350	,,
,, October	350	,,
,, November	550	,,
,, December	550	,,
1881, January	550	,,
,, February	450	,,
,, March	350	,,
,, April	150	,,
,, May	150	,,
,, June	150	,,
Total	4000	tons.

The Coal to be entirely free from refuse of every kind.

Sealed tenders to be addressed to me, and delivered at the Offices by the 20th of the present month.

The Directors do not bind themselves to accept the lowest or any tender.

J. B. BALL, A.I.C.E., Manager.

THE Mansfield Improvement Commissioners are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR produced at their Works at Mansfield for Twelve months, from the 30th of June next. The Tar and Liquor to be removed by the Contractor whenever required by the Manager of the Works. Quarterly cash payments to be made.

The Commissioners do not bind themselves to accept the highest or any tender.

Further particulars may be obtained from J. Heydon, Manager, Gas-Works, Mansfield, Notts.

Tenders to be sent in on or before May 26, 1880, marked "Tender for Tar, &c." and addressed to

R. J. PARSONS, Clerk to the Commissioners.
Mansfield, May 5, 1880.

THE Mansfield Improvement Commissioners invite TENDERS for the Supply of 3300 Tons of best screened GAS COAL, required for use at their Gas-Works, to be supplied from June 1, 1880, to May 31, 1881, in the following proportions, viz.:—

150 tons in each of the months of June and July, 1880.

400 tons in each of the months of August, September, October, November, and December, 1880, and January, 1881.

300 tons in February, 1881.

200 tons in March, 1881.

150 tons in each of the months of April and May, 1881.

or in such other quantities as may be desired in similar proportions.

The Coal to be delivered at Mansfield Station, or at the Works, at the option of the sender, and to be free from sulphur, bats, bind, and refuse.

Tenders to be sent in on or before Wednesday, May 26, 1880, marked "Tender for Coal," and addressed to

R. J. PARSONS, Clerk to the Commissioners.
Mansfield, May 5, 1880.

BOROUGH OF BURY.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Gas Committee of the Corporation of Bury are prepared to receive TENDERS for GAS COAL for One, Two, or Three years, commencing on the 1st of June next, to be delivered free at the railway siding at Buckley Wells, or at the Corporation siding Town's Yard, Fernhill, as may be required. Estimated quantity for the first year, 10,000 tons; for the second and third years, 12,000 tons each.

Further particulars may be obtained upon application to Mr. Samuel Parsons, Manager, Gas-Works, Elton.

Tenders, endorsed "Tender for Gas Coal," stating the colliery from whence the Coal is proposed to be supplied, to be sent to me, the undersigned, on or before Wednesday, the 26th inst.

The Committee do not bind themselves to accept the lowest or any tender.

By order,
FREDERICK BULL, Town Clerk.
Corporation Offices, Bury, May 7, 1880.

COAL CONTRACT.

THE Directors of the Southwark and Vauxhall Water Company are prepared to receive TENDERS for COALS of the various kinds set forth in the Specifications, delivered into stores at their several pumping-stations.

Specifications and form of tender can be obtained at the Engineer's Office, and the same must be forwarded not later than May 25, 1880, addressed to the CHAIRMAN, Southwark and Vauxhall Water Company, Sumner Street, SOUTHWARK, S.E., endorsed "Tender for Coal."

By order.

THE Shipley Gaslight Company invite TENDERS for the following WORK, viz.:—

Contract No. 2.—For the Making and Erection of a Wrought-Iron Roof, with Columns and Box Girder.

Contract No. 3.—For the Making and Erection of Four Cast-Iron Purifiers, with Centre-Valve and Connections complete; also Lifting Apparatus.

Drawings and specifications may be seen on application at the Gas-Works, Shipley, on and after Thursday, the 13th inst.

Sealed tenders, properly endorsed, to be addressed to the Chairman, Gas-Works, Shipley, not later than Friday, the 21st inst.

The Directors do not bind themselves to accept the lowest or any tender.

J. WILCOCK, Secretary.
Shipley, May 8, 1880.

BOROUGH OF ROTHERHAM GAS-WORKS.

TO GASHOLDER MAKERS.

THE Gas Committee invite Tenders for the entire Resheeting of, and Additions to their 80-ft. GASHOLDER. The additions consist of a new set of Wrought-Iron Brackets for Wheels.

Specifications can be seen, and forms of tender obtained, by applying to Mr. Goodwin, Manager, Gas-Works, Rotherham.

Tenders, endorsed "Tender for Gasholder Repairs," to be sent in to me on or before the 20th of May inst. The lowest or any tender not necessarily accepted.

By order,
GEO. W. HODGKINSON, Town Clerk.
Council Hall, Rotherham, May 7, 1880.

BOROUGH OF ROTHERHAM GAS-WORKS.

TO BOILER MANUFACTURERS.

THE Gas Committee invite Tenders for the Supply of Two CORNISH BOILERS 20 ft. by 6 ft., each fitted up with two Flues; also four Cross Tubes and Valves, Gauges and Fitting complete.

Specification and drawings can be seen, and forms of tender obtained, by applying to Mr. Goodwin, Manager, Gas-Works, Rotherham.

Tenders, endorsed "Tender for Boilers," to be sent in to me on or before the 20th day of May inst. The lowest or any tender not necessarily accepted.

By order,
GEO. W. HODGKINSON, Town Clerk.
Council Hall, Rotherham, May 7, 1880.

BRISTOL UNITED GASLIGHT COMPANY.

SPECIFICATION AS TO SUPPLY OF COALS.

THE Directors of the Bristol United Gaslight Company invite TENDERS for the Supply of about 100,000 Tons of GAS COALS, during the Twelve months between July 1, 1880, and July 1, 1881, for use at their Works, situated respectively at Avon Street, St. Philip's, Canons Marsh, and Stapleton Road, Bristol.

In the above-named quantity there is included about 10,000 Tons of Scotch or other Cannels, or other rich Gas Coals from the Northern or Midland Districts.

The Coal to be partly small and partly large or brush, and to be delivered in such monthly proportions as may be required by the Company, and in accordance with the season.

The quality of the Coals must be good, dry, and free as possible from sulphur, bats, binds, refuse, and dirt.

Particulars required of the quality of the Coals for which tenders may be submitted; and the Directors will be glad to receive chemical analyses thereof, and any reliable information in relation to their properties for the manufacture of gas that the parties tendering may be able to supply.

Parties tendering must state the maximum quantities of either small, large, or brush Coal they will undertake to deliver monthly, and it must be understood that the Directors are to be at liberty to accept the terms offered for any lesser quantities they may think fit.

Tenders to state the prices per ton f.o.b. (port of shipment to be named), or delivered at Railway Station, Bristol, or at either of the Works of the Company, and the discount for monthly cash payments.

The Stapleton Road Works are adjoining both the Midland and Great Western Railways, from the latter of which the Company have a siding.

Payment will be made monthly for every ton of 20 cwt., as indicated by the weighbridges of the Company at their respective stations.

Sealed tenders to be addressed to the Chairman of Directors, Bristol United Gaslight Company, Canons Marsh, Bristol, marked "Tender for Gas Coal," and delivered not later than Tuesday, the 1st of June next.

HENRY H. TOWNSEND, Secretary.
Gaslight Offices, Bristol, May 7, 1880.

THE Buxton Local Board invite Tenders for the Supply of GAS COAL and CANNEL for One or more years, at the rate of from 1000 to 1200 tons per annum of each.

The whole to be screened free from Bats, Dirt, or Pyrites to the satisfaction of the Manager of the Gas-Works, and to be delivered at the Gas-Works siding, Ashwood Dale, Buxton, in quantities and at times as he may direct.

Tenders, endorsed "Tender for Coal" or "Cannel," addressed to the Chairman of the Gas Committee, to be forwarded not later than 3 p.m. on Friday, the 14th inst.

The Board is not bound to accept the lowest or any tender.

Any other information required may be obtained on application to the Manager at the Gas-Works.

By order of the Board.
JOSIAH TAYLOR, Clerk.
May 1, 1880.

FOLKESTONE GAS-WORKS.

THE Directors of the Folkestone Gas and Coke Company are prepared to receive TENDERS for the construction of a RETORT-HOUSE, Engine and Boiler House, Coal Stores, and other Buildings, to be erected at their Gas-Works at Folkestone.

Drawings and specification may be inspected, and forms of tender and schedules of quantities may be obtained on application at the Office of the Company at Folkestone, and at the Office of Messrs. Thomas and Charles Hawksley, Civil Engineers, 30, Great George Street, Westminster, S.W., on and after Tuesday, the 4th day of May next; and tenders must be delivered at the Office of the Company at or before 10 o'clock in the forenoon of Friday, the 21st day of May next.

The Company do not pledge themselves to accept the lowest or any tender.

WILLIAM MEDHURST, Jun., Secretary.
Folkestone, April 26, 1880.

SECOND-HAND ENGINES, EXHAUSTERS, BOILERS, &c.

THE Scarborough Gas Company invite OFFERS for the Purchase of their present Duplicate Exhausting Machinery, comprising Two 7-in. Cylinder by 14-in. Stroke Horizontal Steam-Engines; Two 20,000 cubic feet per hour Gwynne and Beale's Patent Exhausters; Two Hydraulic Governors in Connection with Throttle Valves of Engines; and Two Cornish Boilers, 11 ft. by 3 ft. 9 in.

The whole are of superior make and have been carefully used, and are well worth attention, being about to be removed for replacement by larger and more powerful apparatus.

The machinery may be seen in operation until the 30th of April, and further particulars may be obtained on application to the undersigned.

By order,
WILLIAM J. MOON, Manager.
Scarborough, March 5, 1880.

TO COLLIERY OWNERS.

THE Corporation of the Borough of Dewsbury hereby invite TENDERS for the Supply and Delivery of the following quantities of the best GAS COAL and CANNEL:—

12,000 Tons Gas Coal
1,000 Tons Cannel

The Coal is to be well screened and dressed, free from scales, sulphurous pyrites, or other objectionable matter. Deliveries to be made in such quantities and at such times as the Manager may direct, from July 1, 1880, to June 30, 1881. The Coal to be delivered at the Savile Town works, or (if sent by boat) to be delivered into boxes ready for hoisting by the steam crane.

The Corporation do not bind themselves to accept the lowest or any tender.

The Contractors to state in the tender the seam and the pit from which he intends to send the Coal.

Sealed tenders, endorsed "Tenders for Coal," to be sent to Jesse Smith, Esq., Town Clerk, Dewsbury, not later than noon of Wednesday, the 26th day of May.

Further particulars and forms of tender may be had on application to the undersigned.

C. ARMITAGE, Engineer and Manager.
Gas-Works, Savile Town, Dewsbury.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

TAR AND LIQUOR CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR produced at their Works, at Wandsworth, during the next Twelve months.

The Tar and Liquor to be removed by the Contractor, by barges, whenever required by the Company's Engineer. Monthly cash payments to be made.

The Directors do not bind themselves to accept the highest or any tender.

Tenders, marked "Tender for Tar, &c.," to be sent on or before the 17th of May.

North Street, Wandsworth, May 4, 1880.

THE SHREWSBURY GASLIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the Shrewsbury Gaslight Company invite TENDERS for the Supply of Best GAS COAL, to be delivered free at the Great Western or London and North-Western Goods Yard, Shrewsbury, during the three years commencing on June 1, 1880, at such times and in such quantities as may be from time to time required by the Company's Manager.

The Coals are to be well screened, free from bats, bind, or other refuse, and to be freshly got.

About 24,000 tons will be required under the contract.

The Directors reserve to themselves the right to divide the quantity into two or more contracts, and do not bind themselves to accept the lowest or any tender.

Payments—monthly, net.

Tenders to state what allowance per ton will be made for the Company's waggons (the right to run which is to be at the option of the Directors), and also to state what seam the coal offered is to be got from.

Tenders to be sent to the undersigned on or before May 24, 1880.

By order,
WM. BELTON, Secretary and Manager.
Gas-Works, April 30, 1880, Shrewsbury.

GEORGE E. TOURNAY,
CONTRACTOR FOR THE ERECTION AND REBUILDING OF RETORT-BENCHES, CHIMNEY SHAFTS, &c.
RETORT SETTING A SPÉCIALITÉ.
References to large and small Works.
ADDRESS: WINCHEAP, CANTERBURY.

Imperial METER COMPY.,
LIMITED,
Makers of THE IMPROVED DRY GAS-METERS, THE PATENT WET GAS-METERS, Special Meters for Public Lighting, STATION-METERS, Governors, &c.
KING'S ROAD, ST. PANCRAS.
formerly also (**Walter Ford**) at Gray's Inn Road.

TO INVENTORS AND PATENTEES.
MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.
Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.
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Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 22, Great George Street, Westminster.

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THE FIRST AND SECOND VOLUMES
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On the Science and Practice of the Manufacture and Distribution of
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THE
GAS COMPANIES EXPENDITURE JOURNAL,
Being a Ruled Account-Book with Printed Headings, and Analyzing Guide for Keeping, upon the easiest and most correct method, the Expenditure of a Gas Company, in accordance with the provisions of the Gas-Works Clauses Act of 1871, and suitable for all Companies.
Specimen, with illustration and full particulars; 2s. 6d. returned on the purchase of a "Journal."
Published by SANDELL AND SON, Accountants, 2, Great George Street, WESTMINSTER, and W. KING, Office of the JOURNAL OF GAS LIGHTING, 11, Bolt Court, FLEET STREET, E.C.

THE Strabane Town Commissioners will receive TENDERS for CONDENSER and SCRUBBER, &c., Supplied and Erected complete at their Works.
Tenders will be received not later than the 22nd inst.
The Commissioners do not bind themselves to accept the lowest or any tender.
Plans and Specification can be seen on application to
C. REILLY, Manager.

TO COAL PROPRIETORS.
THE Directors of the Cheltenham Gas-light and Coke Company invite TENDERS for the Supply of the best quality of COAL for making gas, for One, Two, or Three Years, from the 1st of July next.
For quantities, particulars, and conditions of contract, application to be made to the Company's Engineer.
Sealed tenders, addressed to the undersigned, must be forwarded on or before Thursday, the 20th of May.
The Directors do not bind themselves to accept the lowest or any tender.
R. O. PATERSON, Engineer.
Gas-Works, Cheltenham, April 26, 1880.

THE Directors of the Exeter Gaslight and Coke Company are prepared to receive TENDERS for the Supply and Erection of CONDENSERS at their Basin Gas-Works.
Plans, specification, and conditions of the same may be seen on application to the Engineer, at the Basin Works; and sealed tenders, endorsed "Tender for Condensers," to be sent to me, the undersigned, on or before Monday, May 17, 1880.
The Directors do not bind themselves to accept the lowest or any tender, nor will they pay for estimates.
By order,
W. A. PADFIELD, Secretary.
April 27, 1880.

WOOD TROUGHING
FOR PRESERVING SERVICE-PIPES.
PRICE FROM THREE-FARTHINGS PER FOOT.
In any Lengths.
THOS. PROUD,
Brookfield Works, Icknield St., Birmingham.

OXIDE OF IRON.
Gas Companies can be supplied with any quantity of Natural Oxide suitable for Gas Purification purposes. Shipped direct from the extensive estates in Co. Donegal of the Earl of Leitrim and Wybrants Olphert, Esq., D.L.
By thus purchasing from the producer a constant supply of the purest material will be ensured to the Gas-Works, and intermediate profits will be saved to the Shareholders.
For terms, references, and particulars apply to
JOHN BEATTIE,
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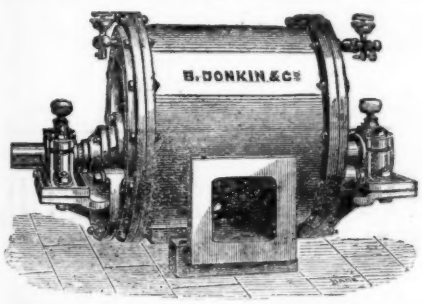

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MESSRS. B. DONKIN & Co. possess the sole right to manufacture these Exhausters.
MADE WITH TWO OUTSIDE BEARINGS AND LATEST IMPROVEMENTS.
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Of every size and shape, and of the best quality; also of White and Coloured GLAZED BRICKS, SANITARY PIPES, &c., &c.
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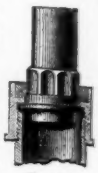
These Unions practically place a Gas Company's property under lock and key, by rendering it impossible to disconnect at any joint at which gas can be obtained unregistered, without destroying the Company's Seal.
In fixing the Union (one being required on the main cock and another on the inlet only), some molten sealing-wax is poured into the recess on cap, and whilst hot impressed with Foulger's patent tong-shaped die, having the Gas Company's title engraved thereon; the wax being forced into the flutings on the lining, instant destruction of the Seal accompanies any attempt at disconnection.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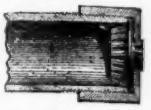
Cannot be taken off without destroying the Company's Seal. A tapered fluted plug (having been white-leaded or puttied) is inserted in the service-pipe. The cap (already filled with sealing-wax) is then screwed over, and tightens on a washer on the flange of plug. The wax is then warmed, and stamped with the engraved die. Absolute security against fraud and escape is thus obtained.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Small additional cost over existing connections.
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Effectually prevents and arrests corrosion.
Has a fine gloss, and is very durable.
Does not require driers like other paints.
Protects iron from action of water.

Is not affected by sulphuretted hydrogen.
Forms a very hard, tough (not brittle) surface.
Will not crack, blister, or scale.
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Covers nearly double the area of other paints. (7 gallons or 1 cwt. will cover 1211 square yards of ironwork.)
Is cheaper and more economical than any other.

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FOR JOINTING AND REPAIRING RETORTS AND OVENS *in* ACTION AND *out* OF ACTION.

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MIDLAND DISTRICT OFFICE: 97, NEW STREET, BIRMINGHAM; AGENT: A. C. SCRIVENER,

Supply the Best Wigan Arley Mine Gas Coal, Gas Nuts, Gas Cannel, &c.

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SPECIAL NOTICE.—Our Patent Machine-Made Retorts have now been thoroughly tested, and have proved themselves infinitely superior to those made by hand. At several large works it has been settled, beyond question, that, owing to the compactness and general excellence, more gas is sent to the gasholder from each ton of coal carbonized than is the case with hand-made Retorts.

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PATENT LANTERN AND FLAT-FLAME BURNERS.

THE FLAT-FLAME IS THE ONLY PRACTICABLE SYSTEM FOR STREET LIGHTING;
And, "in actual use," yields as much light with Common Gas, and more light with Cannel Gas, than any Argand System.

BIRMINGHAM LAMP TESTS.

After the most exhaustive series of experiments, extending over 14 months, with the most complete assortment of Street Lanterns ever brought together—including the Argand Lanterns—the Lighting Committee of the Birmingham Corporation have decided to adopt "Bray's System" for all their street-lighting improvements, for which purpose 65 100-candle power lanterns are immediately required.

NOTE.—The above is the completest possible answer to certain misstatements that are being made regarding these tests.

Extract from the *Leeds Mercury*, April 1, 1880.

At the meeting of the Leeds Town Council, March 31, Alderman Gaunt moved that the Council approve of the acceptance by the Corporate Property Committee of the tender of Messrs. Geo. Bray and Co. for the supply of 21 new lamps, to be placed upon the pillars round the Town Hall. The Committee had tested Sugg's and other lamps, and found Messrs. Bray's the best. It was intended to have two 200-candles power and two 100-candles power, and 17 round the hall of 80-candles power. Mr. Lynd, in seconding the motion, said that he had had an opportunity of seeing different lamps tested at Birmingham, and he was in favour of Messrs. Bray's.

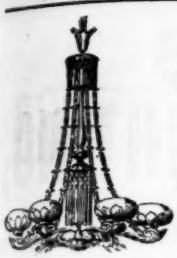
Extract from the *Daily Free Press*, Aberdeen, Jan. 1, 1880.

Judging of the merits of the lights as they appeared last night, on-lookers seemed to be generally of opinion that between Sugg's patent and Bray's larger light at the corner of Union Buildings, Castle Street, there was no perceptible difference in the illuminating power. When the vital question of gas consumption is taken into account, it is found that in the Castle Street lamps there is a marked difference in the quantity of gas consumed, for while 30 feet of gas are hourly burned in Sugg's Patent Lamp, only 20 feet are used by Bray's Lamp during the same period.

[The above Lamps have Meters attached.]

Bray's Lanterns have been adopted by the Vestry of St. George's (which includes "WESTMINSTER"), Hanover Square, London, for all the crossings and refuges of that important district, after a direct competition with the Argand system of lighting; and also by about 40 Towns and Vestries, after a similar competition in most cases.

GEORGE BRAY & CO., BLACKMAN LANE, LEEDS.



F. & C. OSLER,

45, OXFORD STREET, LONDON, W.

MANUFACTORY AND SHOW-ROOMS:

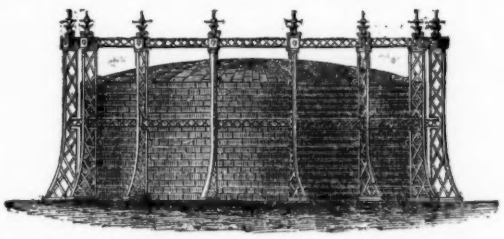
BROAD STREET, BIRMINGHAM.

ESTABLISHED 1807.

MANUFACTURERS OF CRYSTAL GLASS CHANDELIERS, WALL LIGHTS, AND LUSTRES FOR GAS AND CANDLES.

TABLE GLASS OF ALL KINDS.

CHANDELIERS IN BRONZE AND ORMOLU. MODERATOR LAMPS.



THE HORSELEY COMPANY,

LIMITED,

TIPTON, STAFFORDSHIRE.

LONDON OFFICE:

6, WESTMINSTER CHAMBERS, VICTORIA STREET,

GAS ENGINEERS, IRONFOUNDERS, &c.,

MANUFACTURERS OF

GASHOLDERS, WROUGHT AND CAST IRON TANKS, CONDENSERS, PURIFIERS, SCRUBBERS, MAINS, RETORT-LIDS, PLAIN AND DISHED, LAMP-POSTS, PIPES,

AND ALL REQUISITES FOR EITHER

GAS OR WATER WORKS;

ALSO

MAKERS OF ROOFS, BRIDGES, &c.

S. OWENS & CO.,

WHITEFRIARS STREET, LONDON, E.C.,

HYDRAULIC ENGINEERS,

AND MANUFACTURERS OF

PUMPING MACHINERY of every Description.

SOLE LICENSEES AND MANUFACTURERS FOR GREAT BRITAIN OF

BLAKE'S PATENT STEAM-PUMPS.

More than 10,000 in use,

ESPECIALLY ADAPTED FOR USE IN GAS AND CHEMICAL WORKS, FOR PUMPING TAR, WATER, AMMONIACAL LIQUOR, ACIDS, &c.

The following are some of the prominent advantages of the BLAKE PUMP:—

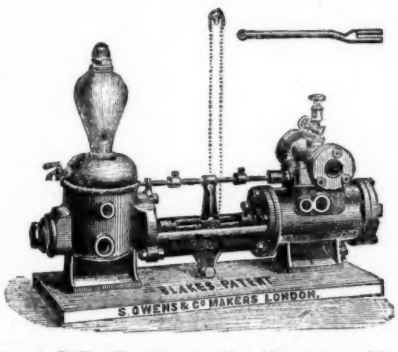
It will start at any point of stroke.

It has no dead point.

It works fast or slow, with the same certainty of action.

It is economical. Has a lead on the slide-valve.

It is compact and durable.



It is interchangeable in all its working parts.

It will deliver more water than any other pump.

It is made of best materials in the most workmanlike manner.

Can be worked at 20 strokes per hour, or 200 strokes per minute.

This Illustration represents Boiler-Feed Pumps, Sizes Nos. 1, 2, and 3, with Hand Lever for working Pump when Steam is not available.

SOLE MANUFACTURERS OF

MANN & OWENS IMPROVED PATENT GAS-VALVES.

PRICED LISTS AND FULL PARTICULARS FURNISHED ON APPLICATION.

WANTED, by Samuel Thompson & Co., Colliery Office, Lancaster, APPLICATION for PRICES from Gas Managers who are prepared to receive Tenders for GAS COAL or CANNEL.

John Leigh, Esq., M.R.C.S., F.C.S., &c., &c., in his analytical report of S. T. & Co.'s Coal, says: "It is remarkable for its purity, I have scarcely ever examined a Coal containing so small a quantity of ash, and when Cannel of the best description is scarce, it may well replace this material."

THOMAS CARR & SON,

MANUFACTURERS OF

FIRE-BRICKS, LUMPS, TILES, RETORTS, &c.,

SCOTSWOOD FIRE-BRICK WORKS, SCOTSWOOD-ON-TYNE.

Also Makers of all kinds of Common Building Bricks, and of Pressed White and Red Bricks for Facing.

JAMES OAKES & CO.,

ALFRETON IRON-WORKS, DERBYSHIRE,

AND

WENLOCK IRON WHARF, 21 & 22, WHARF ROAD, CITY ROAD, LONDON, N.,

Manufacture and keep in stock at their works (also a large stock in London) PIPES and CONNECTIONS 1½ to 48 inches in diameter; and make to order Retorts, Purifiers, and Tanks, with or without planed joints, Columns, Girders, Special Castings, required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Syphons and Covers are joint-faced if required, doing away with millboard and iron boring, or Syphons made without Covers, a socket being cast on and fitted with a small plug about 6 inches in diameter with lead joint. In either way preventing leakage.

MEMORANDUM FOR GAS COMPANIES.

TORBAY AND DART PAINT COMPANY, LIMITED,

SOLE PROPRIETORS AND MANUFACTURERS OF

WOLSTON'S TORBAY PAINTS.

OFFICES:

23, GREAT GEORGE STREET, WESTMINSTER, LONDON, S.W.

WORKS:

DARTMOUTH AND BRIXHAM, DEVON.

TRADE MARK

These celebrated Paints are now very generally acknowledged to be the best and most economical in use. GAS COMPANIES especially have, by experience, proved that no others so fully meet their peculiar requirements, as they are not only UNAFFECTED BY GREAT HEAT and EFFECTUALLY RESIST SULPHURETTED HYDROGEN, AMMONIA, &c., &c., but they may be applied to GASHOLDERS that have hitherto been covered with the unsightly coal tar.

They are also cheaper than other paints and compositions; TWO COATS OF GENUINE WOLSTON'S TORBAY PAINT BEING EQUAL IN COVERING POWER TO THREE OF LEAD PAINT, or any of the numerous low-priced spurious oxides that are now in the market, whilst the durability of Wolston's is unrivalled.

The colours most approved for GASHOLDERS, PURIFIERS, SCRUBBERS, and all the plant and machinery used in and about Gas-Works, are—

FOR DARK TINTS.

No.	p. Cwt.	No.	p. Cwt.
13. Torbay Red	34s.	8. Bronze Green	36s.
6. Dart Brown	34s.	16. Torbay Chocolate	34s.
10. Carriage Red	34s.	4. Brixham Black	32s.
1. Torbay Brown	30s.		

FOR LIGHT TINTS.

No.	p. Cwt.	No.	p. Cwt.
7. Imperial Stone	34s.	19. Light Stone	36s.
29. Portland Stone	38s.	30. Bath Stone	38s.
31. Gray Stone	38s.	38. Buff	36s.

These Prices are for Paints in paste, carriage paid to any Gas-Works in Great Britain, in consignments of not less than 5 cwt.; but all the above colours may be had, READY MIXED FOR THE BRUSH, IN VARIOUS SIZED PAINT CANS WITH HANDLES, AT A UNIFORM PRICE OF 56s. PER CWT. (6d. PER LB.) carriage paid as above, in consignments of not less than 2 cwt., the sizes being 3 lb., 7 lb., 14 lb., and 28 lb. By taking the Paints in this convenient form, a considerable saving is effected in time, &c., as they can be immediately applied by any workman without the intervention of skilled painters to mix and prepare them; besides which all waste is avoided, and they may always be relied on as containing no adulterating or inferior material.

Where light colours are preferred, the work should be primed with two coats of No. 7, and finished with either of the other stone colours; and when the darker colours are selected, a priming coat of No. 13 is recommended.

Specimen Cards forwarded and Inquiries attended to on application to

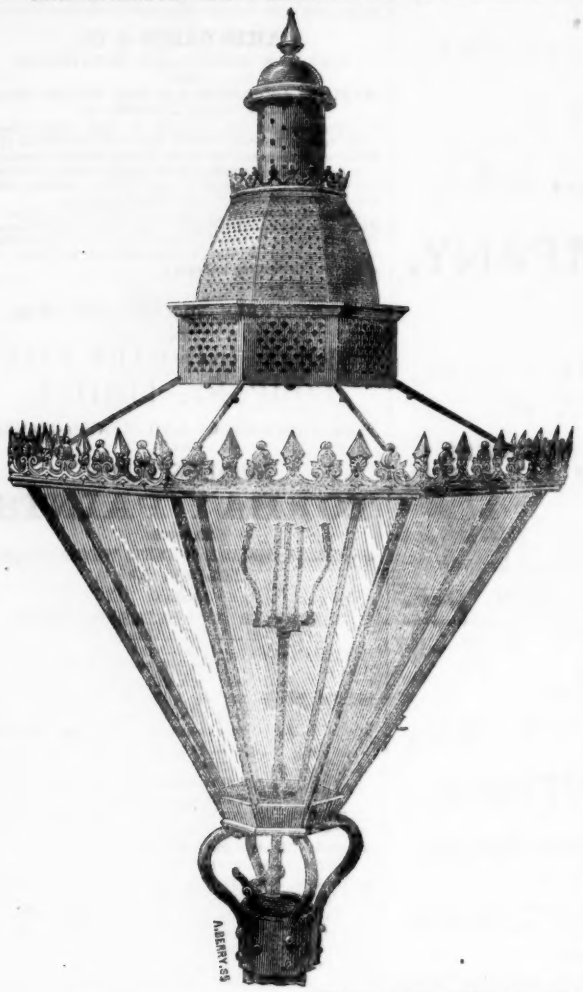
23, GREAT GEORGE STREET, WESTMINSTER, LONDON.

WILLIAM SUGG'S
IMPROVED SYSTEM OF STREET LIGHTING,

SUITABLE FOR CANNEL OR COMMON GAS.

NEW PATTERN LANTERN for "LONDON" ARGAND BURNERS of 50 to 400 Candle Illuminating Power, as supplied to the Metropolitan Railway Stations.

NOTWITHSTANDING the various statements that have been assiduously circulated of late, tending to prejudice Public Companies, Corporations, and Vestries against the recognized superiority of my large Argand Burners (established by tests made by eminent scientists, and confirmed by testimonials received from numerous Engineers of Gas-Works, which have appeared from time to time in the Advertisements of the JOURNAL), **the Highest Results** obtained at the recent trial of large Burners for Street Illumination held at Birmingham—where the most complete collection of large Burners and Lanterns extant had been assembled—were produced by the **200-candle and other large Argand Burners of my make**; clearly substantiating the statement I have repeatedly published, that the **Sugg Burners give over 30 per cent. Illuminating Power more than can be obtained from any other Burners with the like quantity and quality of Gas.**



It remains, moreover, to be mentioned that at the same trial my **Flat-Flame Burner**, with patent circular slit (patented 1875), produced the highest result in illuminating power of all the competitive Flat-Flame Burners present.

Amongst other places, the Burners and Lanterns have been adopted at—

PETERBOROUGH	DONCASTER	GREAT GRIMSBY
LEEDS	LONDONDERRY	SWANSEA
SCARBOROUGH	SHEFFIELD	CARDIFF
EASTBOURNE	BELFAST	W. HARTLEPOOL
DURHAM	OLDHAM	SOUTHAMPTON
CHESTERFIELD	GLASGOW	PORTSMOUTH
CORK	DUBLIN	LEITH
NOTTINGHAM	HASTINGS	PAISLEY
LEICESTER	SUNDERLAND	PERTH
STOKE-UPON-TRENT	ROCHDALE	WIGAN
RAMSGATE	SOUTH SHIELDS	READING
BLACKBURN	IPSWICH	SALFORD
GREENOCK	BRIGHTON	MANCHESTER
LIVERPOOL	COLCHESTER	BIRMINGHAM
BOURNEMOUTH	NEWRY	LANCASTER

Buenos Ayres, Monte Video, Hong Kong, Singapore, New York, Philadelphia, San Francisco, Milwaukee, Quebec, Ontario, Ottawa, Boston, Sydney, Melbourne, Port Adelaide, Berlin, Vienna, Cologne, The Hague, Amsterdam, Rotterdam, Brussels, &c., &c.

Extract from the JOURNAL OF GAS LIGHTING, *&c., March* 16, 1880.

EXPERIMENTS IN IMPROVED STREET-LIGHTING AT BIRMINGHAM.

PUBLIC TRIAL, WEDNESDAY, MARCH 10, 1880.

After a prolonged inspection of the various Lanterns and Burners, tests were made by a shadow meter between Sugg's 200-candle Argand (No. 9), Bray's 200-candle Quadruple Bat's-wing (No. 10), and the Burner and Lantern as used by the Paris Gas Company in the Rue du Quatre Septembre (No. 12), with the results as shown in diagram, fig. 2. These appear to agree pretty nearly with the photometrical results obtained from each Burner, as shown in the preceding table (Mr. Hunt's Experiments, see page 404 of JOURNAL, March, 1880.)

PHOTOMETRICAL TRIALS.

No. 9. *Sugg's* 200-*Candle Argand Opal Top, Consumption per hour* 44 *cub. ft.*	*No.* 10. *Bray's* 200-*Candle Quadruple Bat's-wing, Consumption per hour* 50 *cub. ft.*	*No.* 12. *Burner and Lantern used by the Paris Gas Company in the Rue du Quatre Septembre, Consumption per hour* 32 *cub. ft.*
Light equal.		*Light equal.*
79·5 ft.	70·5 ft.	85 ft. / 65 ft.
150 ft.	150 ft.	150 ft.

FIG. 2.

NOTE.—The Lights were fixed on Posts in the manner they are used in the Public Streets.

THE RESULTS WORK OUT AS FOLLOWS:—

No. 9.	**No. 10.**	**No. 12.**
27 per cent. better than No. 10. = 191·7 Candles.		**= 92·8 Candles.**
Add 24·0 Candles for the extra 6 feet of gas required to equal the consumption of No. 10.	**= 151 Candles, or 8 per cent. better than No. 12.**	**If the consumption had been 50 ft., the Illuminating Power would have been at the same rate—138 Candles.**

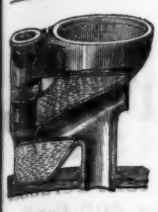
Total 215·7 Candles, or 42 per cent. better than No. 10 for the same quantity of gas.

The next best on the List is Sugg's 100-candle Argand Burner, as fixed on the Refuges in the districts of the Phœnix Gas Company, London Gas Company, Commercial Gas, and Gaslight and Coke Company. They have been, moreover, definitely adopted by the Vestries of Lambeth, St. George's, St. Mary's (Rotherhithe), Lewisham Board of Works, St. Giles's Board of Works, as well as the Great Eastern, Great Northern, London, Brighton, and South Coast, and Metropolitan Railways.

The fact that over 1200 of these large Burners and Lanterns have been supplied to almost every Gas Company or Municipal Authority in England alone, within a very short time, speaks significantly of the excellence of this system, and the real merits it has been proved to possess.

PRICES AND PARTICULARS ON APPLICATION TO

WILLIAM SUGG, GAS ENGINEER, VINCENT STREET, WESTMINSTER, S.W.



SMEATON'S TRAPLESS CLOSETS.

MESSRS. W. SMEATON & SONS,
HOT WATER AND SANITARY ENGINEERS.

PATENTEES AND INVENTORS OF THE
TRAPLESS, THE D TRAP, AND EDDYSTONE CLOSETS.
Also the New
ECLIPSE COMBINATION CAST LEAD TRAP.

The Price will be half of the old-fashioned D Trap, it being cast all in lead, without a Joint. Send at once for an Illustrated Price List to their Wholesale and Retail Agent,

G. R. GLENIE,
WALBROOK HOUSE, 37, WALBROOK, LONDON, E.C.

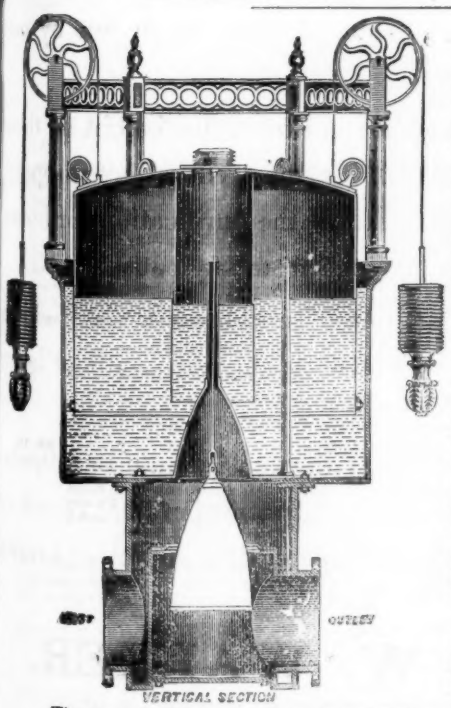
A large Discount to the Trade and Shippers. Estimates Given and Contracts Taken.

R. DEMPSTER AND SON'S

WOOD SIEVES FOR PURIFIERS,
WITH TAPER OR PARALLEL BARS,
MADE BY SPECIAL MACHINERY.
SCRUBBERS FILLED WITH BOARDS,
On our approved principle, for the extraction of Ammonia.
Prices on application. References to First-Class Engineers.
ROSE MOUNT IRON-WORKS,
ELLAND, Near HALIFAX.
London Offices: 2, SUFFOLK LANE, CANNON STREET, E.C.

J. & J. BRADDOCK,
GLOBE METER-WORKS, OLDHAM,
MANUFACTURERS OF
WET AND DRY CONSUMERS GAS-METERS,
OF THE HIGHEST EXCELLENCE ONLY;
ROUND STATION-METERS,
ON CAST-IRON STANDS;
SQUARE STATION-METERS,
WITH PLANED JOINTS.

Messrs. Braddock beg to submit to Gas Engineers their
PATENT COMPENSATING GAS GOVERNOR,
Which is designed to give an uniform pressure at the Outlet to the Main at all draughts up to the full quantities which the Governors are made to control, such outlet pressure being less than the initial pressure.



The uniformity of pressure is obtained by introducing a compensating chamber into the Bell or Holder of the Governor, which compensator is of the same area as the valve, both of which are operated on by the initial pressure, thereby placing the valve in equilibrium, no matter what the initial pressure may be. The action on the Bell is by the Gas passing along a pipe from the outlet, and the pressure is regulated by weights in connexion with the Bell as required.

From the sectional elevation attached hereto, it will be seen that only the Gas required to operate the Bell comes in contact with the water of the tank, which water will remain comparatively sweet and free from odour. That in case of accident to the Bell, no more Gas can escape than would pass up the pipe covering the valve-rod and Bell supply-pipe.

These Governors have been made and sent out of various sizes for from 2 to 30-inch Mains, and give most satisfactory results.

They can be made with Float in the Bell, or counterpoise as per section.

C. & W. WALKER'S
WOOD PURIFIER SIEVES,
Which have now been used for fifteen years, and their advantages and durability fully established. They are made entirely by steam machinery in very large quantities at the most moderate cost.

MIDLAND IRON-WORKS,
DONNINGTON, Near NEWPORT, SHROPSHIRE.
FINSBURY CIRCUS, LONDON.

MOBBERLEY & PERRY,
FIRE CLAY and BRICK WORKS,
STOURBRIDGE.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAY.
Manufacturers for Home and Export.
GAS-RETORTS, GLASS-HOUSE FURNACE,
BLAST-FURNACE, TANK BRICKS, LUMPS, TILES,
And Every Description of Best Fire-Bricks.

TROTTER, HAINES, & CORBETT,
BRETTELL'S ESTATE
FIRE CLAY & BRICK WORKS,
STOURBRIDGE.
Manufacturers of GAS-RETORTS, GLASS-HOUSE FURNACE & BLAST-FURNACE BRICKS LUMPS, TILES, and every description of FIRE-BRICK.
Proprietors of
BEST GLASS-HOUSE POT and CRUCIBLE CLAYS.
Shipments Promptly and Carefully Executed.

ESTABLISHED IN 1860.
BENJAMIN CARPENTER,
THE ORIGINAL MANUFACTURER OF THE IMPROVED
WOOD SIEVES
FOR
GAS PURIFIERS & SCRUBBERS.
PROVIDENCE WORKS,
22, HERMES STREET, PENTONVILLE ROAD,
LONDON, N.

The Dunston Engine Works Co.,
GATESHEAD-UPON-TYNE.
Are the Sole Manufacturers of
Archer's Patent Hoists,
also of
Archer's Patent Stone Breaker,
and of
Archer's Patent Ore Crusher & Pulveriser,
The last-named Machine (without the Pulveriser) makes the best and most durable Coke Breaker.

GEORGE'S
Patent Gas Calorigen,
A STOVE FOR
WARMING AND VENTILATING.
Recommended by Dr. Richardson.
Manufacturers:
J. F. FARWIG & CO.,
36, QUEEN STREET, CANNON ST., LONDON.

Gold Medal Awarded, Paris Exhibition, 1878.
THOMAS TURTON AND SONS,
SHEAF AND SPRING WORKS,
SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS,
STEEL OF ALL DESCRIPTIONS,
SCREW STOCKS, TAPS, AND DIES, SPANNERS,
RATCHET BRACES, LIFTING-JACKS,
ANVILS, VICES,
AND ENGINEERS TOOLS GENERALLY.
LONDON OFFICE:
90, CANNON STREET, E.C.

THE MANN & WALKERS' PATENT SCRUBBER.

Extensive use.

The successful and extensive use of the Mann and Walkers' Patent Scrubber in all parts of the world has demonstrated their advantages, and entitled them to be received with credit and confidence. The number of them in use is about twenty times that of any other known means of purifying gas from ammonia.

Small quantity of Water required.

By a very small quantity of clean water (not more than 5 or 6 gallons per ton of coals carbonized) the whole of the Ammonia contained in the Gas is completely absorbed; the Gas, after only once passing through, issuing from the Scrubber outlet completely purified from Ammonia. The Scrubber gives no appreciable back pressure.

Residual Product obtained.

The Residual Product—namely, the Ammoniacal Liquor—is obtained at from 20 to 30 ounces commercial strength, which enables it, after being mixed with the weaker Liquor from the hydraulic main and condensers, to be sold to the Manufacturing Chemists, or converted into Sulphate, at the degree of strength found most profitable to the Gas Company.

Illuminating power increased.

The Scrubber is a Saturator, and the Gas being soaked in this strong solution of Ammonia in the lower columns of the Scrubber, is purified from a large amount of Carbonic Acid, and its Illuminating Power is thereby increased.

Small amount of power required.

The friction is so little, and the motion so slow, that the power necessary to work the Scrubber is almost inappreciable. A small gas-engine will work a pair of Scrubbers, purifying 2 million cubic feet of gas per day.

Beckton Gas-Works.

There are thirty of these Patent Scrubbers in the Beckton Gas-Works, equal to purifying 30 million cubic feet per day, and the total amount of engine power necessary to work the whole 30 is not equal to that given out by one 10-horse engine.

Reserve purifying power contained.

There is also a most important advantage arising from the height of these Scrubbers, in the reserve force contained in them. In the event of any stoppage, the mass of soaked and wetted material would continue the purification for hours, even if the supply of water and working were stopped from any cause.

Internal Materials not changed.

The changing of the soaking materials in these Scrubbers is very seldom required; they are well known to remain in action for seven years without being emptied.

Guarantee.

They are in all cases erected under guarantees; they easily fulfil the stipulations of any Act of Parliament, and the chemical restrictions of the Board of Trade; and in cost they are much less to a Gas Company than any other known means of purifying Gas from Ammonia.

C. & W. WALKER.

8, *Finsbury Circus, London, E.C.*

J. & H. ROBUS,

BUILDERS AND CONTRACTORS

FOR THE ERECTION AND REBUILDING OF GAS AND WATER WORKS,

RETORT-SETTING—A SPÉCIALITÉ.

ROBUS'S IMPROVED RETORT-SETTINGS, guaranteed to Carbonize a large amount of Coal with a small per cent. of Fuel.

ESTIMATES GIVEN FOR MAIN-LAYING.

N.B.—All kinds of Fire Goods and Gas Apparatus supplied on the shortest notice.

Address:—J. & H. ROBUS, BELL GREEN, CATFORD, LONDON, S.E.

JAMES MILNE & SON,

GAS ENGINEERS,

Gas-Meter, Gas Apparatus, and Gas-Fittings Manufacturers,

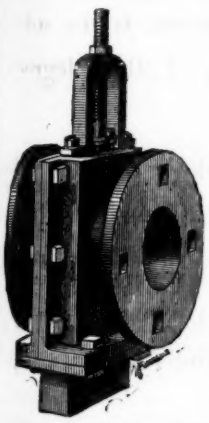
EDINBURGH, AND

2, KING EDWARD STREET,

NEWGATE STREET, LONDON.

STATION-METERS GOVERNORS, CONSUMERS METERS, GAS LUSTRES, CHANDELIERS, BRACKETS, &c.,

And every description of Gas-Fittings and Gas Apparatus.



IMPROVED

BRIDGE VALVES

For Regulating the Seal of Hydraulic Mains in Gas-Works.

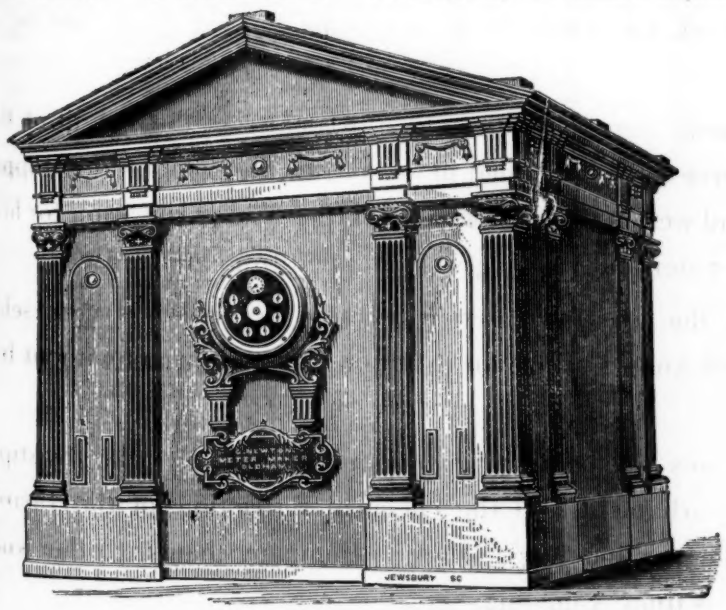
These Valves are so arranged that, when once adjusted for the proper overflow, they can be closed entirely and *opened* again without altering the adjustment.

B. DONKIN & Co.,

BERMONDSEY, LONDON, S.E.

GEORGE NEWTON,

UNION STREET WEST, OLDHAM,



MANUFACTURER OF

SQUARE STATION-METERS, with PLANED JOINTS;

ROUND STATION-METERS, WITH CAST-IRON STANDS;

WET AND DRY CONSUMERS GAS-METERS, GOVERNORS, &c.

GAS COAL.

THE MIRFIELD COAL COMPANY are supplying GAS COAL of the best quality on trucks at their siding. This Coal contains 10 per cent. of Cannel, and, as analyzed by Mr. James Paterson, of Warrington, yields 12,600 *cubic feet of* 16·67-*candle gas, with* 1430 *lbs. of good Coke, per ton.* Ash in Coke, 1·68.

Apply to the MIRFIELD COLLIERY, Mirfield, NORMANTON. London Agent: Mr. F. J. LEE SMITH, 38 THROGMORTON ST.

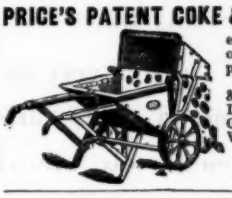
NOTICE TO MANAGERS OF GAS COMPANIES.

THE LAW UNION FIRE AND LIFE INSURANCE COMPANY, of No. 126, Chancery Lane, London, grants Policies of Insurance on Gas-Works, and Buildings connected therewith, which cover risk of explosion and spontaneous ignition of Coal, on very advantageous terms. Full particulars will be sent post free on application to

FRANK M'GEDY, Secretary.

126, Chancery Lane, London.

PRICE'S PATENT COKE & COAL BARROW



effecting a great saving of time, labour, and expense.

For particulars, price, &c., apply to Mr. E. PRICE, Inventor and Patentee, Gas-Works, Hampton Wick, MIDDLESEX.

Prices are Reduced.

BELGIAN CLAY RETORTS.

J. SUGG and CO., late ALBERT KELLER, GHENT.—The removal of the import duties on Earthenware permitting the entry of Clay Retorts into England, Messrs. Sugg, of Ghent, beg to draw the attention of the Gas Companies of London, and other Cities, to the very superior quality of the RETORTS manufactured by them. They can be made of any size, in one piece, and of any form. The price will be in proportion to the weight, and very moderate in comparison to their value.

Communications addressed to J. SUGG & Co., GHENT, will receive immediate attention.

JAMES NEWTON & SONS,

(Established 1820.)

FIRE-BRICK AND TILE MERCHANTS,

Wholesale and for Exportation,

FALCON DOCK, 78 AND 79, BANKSIDE,

SOUTHWARK, LONDON, S.E.,

DEPÔT for STOURBRIDGE AND NEWCASTLE FIRE-BRICKS, LUMPS, TILES, and FIRE-CLAY, and every Article suitable for

GAS AND WATER WORKS.

THOMAS PROUD,

BROOKFIELD WORKS,

103, ICKNIELD ST., BIRMINGHAM,

MANUFACTURER OF

WOOD GRIDS

FOR

PURIFIERS AND SCRUBBERS,

AND

GENERAL STEEL AND IRON TOOLS AND MATERIAL USED IN GAS-WORKS.

ERECTION of CHEMICAL PLANT.

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LIQUOR AMMONIA APPARATUS, GAS LIQUOR, URINE, &c.

GREAT IMPROVEMENT IN PLANT.

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Continuous Method.

IMPROVED "COFFEY STILL" PROCESS, &c.

APPARATUS FOR MAKING AMMONIACAL LIQUOR FROM NITROGENOUS MATTERS.

Models of above plant, prices £2 10s., £3 10s., £7 10s.

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JOHN ROMANS, C.E., F.G.S.E.,

CONSULTING GAS ENGINEER

AND

CANNEL COAL FACTOR,

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Plans and Estimates furnished; Gas-Works, Apparatus, Pipes, Machinery, Fire Goods, &c., supplied, or Attested and Shipped for Exportation.

GAS-WORKS TAKEN ON LEASE.

Mr. ROMANS has for upwards of 30 years been practically engaged in the Manufacture of Gas, and has, by extensive experiments, ascertained that by JUDICIOUS INTERMIXTURE of the lighter with the heavier gases, much of the rich Hydrocarbons CAN BE SAVED, which otherwise ARE LOST, during the process of manufacture. He is therefore enabled to give advice to those who favour him with their orders for Cannel, as to the class which will secure for their standard of illuminating power the HIGHEST ADVANTAGEOUS RESULTS.

ANALYSIS AND PRICES FORWARDED ON APPLICATION.

ROBERT MARSHALL,

CANNEL COAL MERCHANT,

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SHOTT'S BOGHEAD.

HARTHILL CANNEL

Yields 14,920 cubic feet of 40·92-candle gas per ton.

THRASHBUSH CANNEL

12,580 cubic feet of 40·22-candle gas per ton, and 9 cwts. of good coke.

LOTHIAN'S CANNEL

Yields 12,500 cubic feet of 34-candle gas per ton, and 9 cwts. of excellent coke, containing only 4 per cent. of ash.

MUIRKIRK, No. 1, CANNEL

Yields 12,160 cubic feet of 32·5-candle gas per ton, and 10 cwts. of excellent coke, containing only 5 per cent. of ash. This cannel is almost free from sulphur.

OLD WEMYSS CANNEL

Yields 13,320 cubic feet of 32·5-candle gas per ton.

Prices and full analyses on application at above address, or from WEDDERSPOON, FERGUSSON AND CO., 21, Lime Street, LONDON, E.C.

HEBBURN MAIN GAS COAL.

This Coal is now highly approved of for gas making, and yields over 10,000 feet per ton of 15-candle gas, and about 14 cwt. coke.

For references and prices, either f. o. b. or by rail, apply to

W. RICHARDSON,

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GAS COAL.

POPE & PEARSON, LIMITED, have now the authority of several of the most eminent Gas Engineers of London in stating that their Coal yields *in practical working over* 10,000 *cubic feet of gas, with an illuminating power of* 16 *candles;* or by the standard burners now used by the London Gas Companies, an illuminating power equal to 17½ candles.

One ton yields 12½ cwt. of good coke. This Coal can be shipped from Hull, Goole, Liverpool, Morecambe, and Barrow.

For further particulars, apply to POPE AND PEARSON, LIMITED, West Riding and Silkstone Collieries, near LEEDS.

GAS COAL.

THE Tawd Vale Colliery Company, Limited, are prepared to Contract for the Supply of their superior Arley and other GAS COALS, and to send samples to the order of Gas Engineers and others, or complete Analysis, on application. Shipped at Liverpool, Preston, Fleetwood, Garston, or Birkenhead.

Mr. James Paterson, C.E., F.G.S., in his analysis of T. V. Arley Coal, says: "Some parts merge into a semi-Cannel; gas per ton, 10,300 cubic feet; illuminating power, 16·96 candles; coke of high quality, 1431 lbs. per ton."

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THE

SILICA FIRE-BRICK CO.,

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Near SHEFFIELD,

Manufacturers of THE ORIGINAL SILICA OR DINAS FIRE-BRICKS. Specially adapted for Gas-Retort Furnaces and for Siemens's Gas-Furnaces. Shipments promptly executed to London, Liverpool, Hull, Grimsby, &c.

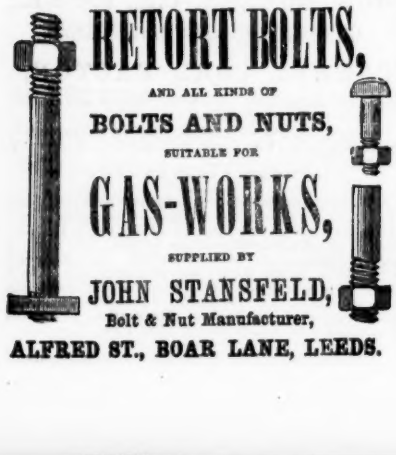
BIRTLEY IRON WORKS,

CHESTER-LE-STREET, DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.



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SUITABLE FOR

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AGENT FOR

THOMAS BARR'S LESMAHAGOW MAIN CANNEL,

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NEWTON, CHAMBERS, & CO.'S SILKSTONE GAS COALS.

Analyses and Quotations on application.

WILSON CARTER AND PEARSON,

GAS COAL AND CANNEL FACTORS,

Supply to any Railway Station or for Export all kinds of Fuel for Gas purposes.

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GAS AND CONSULTING ENGINEER,

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PATENTEE and MANUFACTURER of the following Inventions:—

RETORT SETTINGS—giving great Economy of Fuel.

STEAM-ENGINES and EXHAUSTERS, FOUR-WAY VALVES, WASHERS, SCRUBBERS.

FUEL-MACHINE, for Compressing Breeze and Tar.

N.B.—Pamphlet, with Twenty-Eight Illustrations and Letterpress, on the Construction of Gas-Works, will be sent, post free, on receipt of 4s. in stamps To be had of the AUTHOR; or at the Office of the "JOURNAL OF GAS LIGHTING."

PRICES AND ALL PARTICULARS TO BE HAD OF THE PATENTEE,

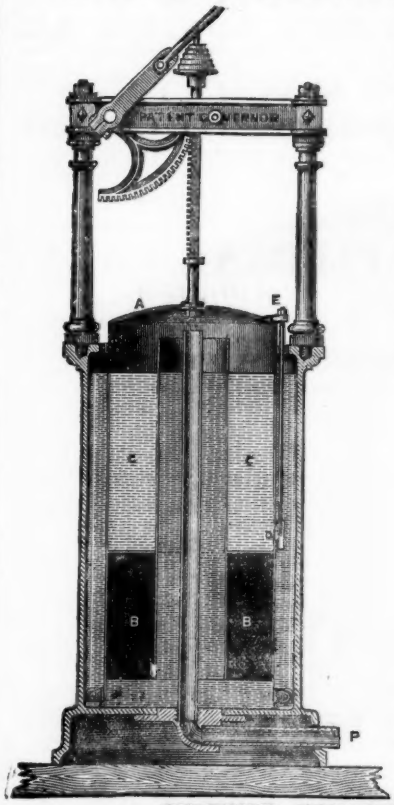
35a, GREAT GEORGE STREET, WESTMINSTER, S.W.

GEORGE WALLER & CO.,

GAS AND HYDRAULIC ENGINEERS,

Patent Compensating Steam Governor,

WITH SELF-CONTAINED WATER-BALANCE.



This is the most efficient and perfect Governor yet made to control and regulate the speed of Engines and Exhausters according to the varying make of gas, and maintain a steady gauge, whether working level or with six inches of seal.

It is the only Governor that will effectually control Condensing and Compound Engines, especially when the Exhauster is on light work, and the Engine is large.

During the drawing and charging of Retorts, the Engine requires no attention—a matter of great importance in small works.

Descriptive Circular sent on application.

They are in use at

BECKTON,
HAMPTON WICK,
DUKINFIELD,
HARTLEPOOL,
NEWCASTLE-ON-TYNE,
RAMSGATE,
SUTTON,

and about 30 other works.

G. W. and Co. make **special Steam Throttle Valves,** suitable for working with this Governor, and alter existing Throttle Valves to same plan.

See also advertisement, page 723.

PHŒNIX ENGINEERING WORKS,

Holland Street and Bear Gardens, Southwark, S.E.

JOHN HALL AND CO., STOURBRIDGE,

Manufacturers of FIRE-BRICKS, LUMPS, TILES,

AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 16 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.

GEORGE ORME & CO.,

ATLAS METER-WORKS, OLDHAM,

MANUFACTURERS OF

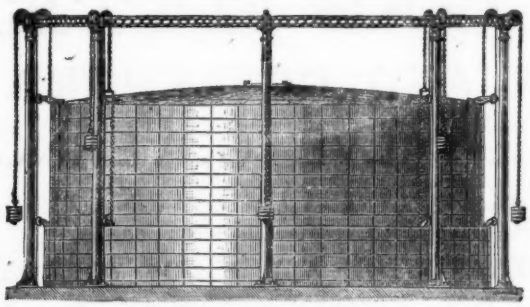
WET AND DRY GAS-METERS,

STATION-METERS, GOVERNORS,

PRESSURE AND EXHAUST REGISTERS,

LAMP-METERS IN CAST-IRON BOXES,

And every Description of Gas Apparatus.



J. T. B. PORTER & CO.,

GAS ENGINEERS & MANUFACTURERS,

IRONFOUNDERS AND CONTRACTORS,

GOWTS BRIDGE WORKS,

LINCOLN.

LONDON OFFICES: 1, WESTMINSTER CHAMBERS, S.W.

ESTIMATES FOR GAS-WORKS OF ANY SIZE.

REFERENCES TO 500 WORKS ALREADY ERECTED.

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MECHANICAL AND CONSULTING GAS ENGINEER

NORWOOD, NORTHENDEN ROAD,

SALE, NEAR MANCHESTER.

SANDELL AND SON,

PUBLIC ACCOUNTANTS,

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SANDELL AND SON having been engaged during the past 25 years in Gas Companies Accounts, either in Preparing or Investigating Statements for Parliamentary Applications, Arbitrations, and otherwise, offer with confidence their Services for similar purposes.

ALFRED LASS, F.I.Accts.,

SPECIAL ACCOUNTANT FOR GAS AND WATER UNDERTAKINGS,

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Accounts Analyzed and Statistics Prepared for Parliamentary Proceedings, Arbitrations, &c.

The Forms of Account, which have been specially designed by Mr. Lass to meet the requirements of the Gas-Works Clauses Amendment Act, 1871, are now in use by many Gas Companies, Corporations, and Local Boards.

HARPER & MOORES,

PROPRIETORS OF THE

BEST STOURBRIDGE CLAYS,

STOURBRIDGE.

Manufacturers of all Descriptions of

BEST STOURBRIDGE FIRE-BRICKS, LUMPS, AND CLAY RETORTS

Of all Dimensions for Gas-Works,

GLASS-HOUSE POTS & CRUCIBLES

ESTABLISHED 1836.

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WILLIAM MACLEOD & CO.,

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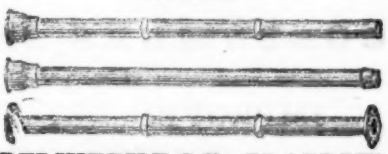
CAST-IRON GAS AND WATER PIPES.



DELIVERY F.O.B., GLASGOW.

Prices on application.

THE LOCHORE & CAPLEDRAE CANNEL COAL COMPANY,

Limited,

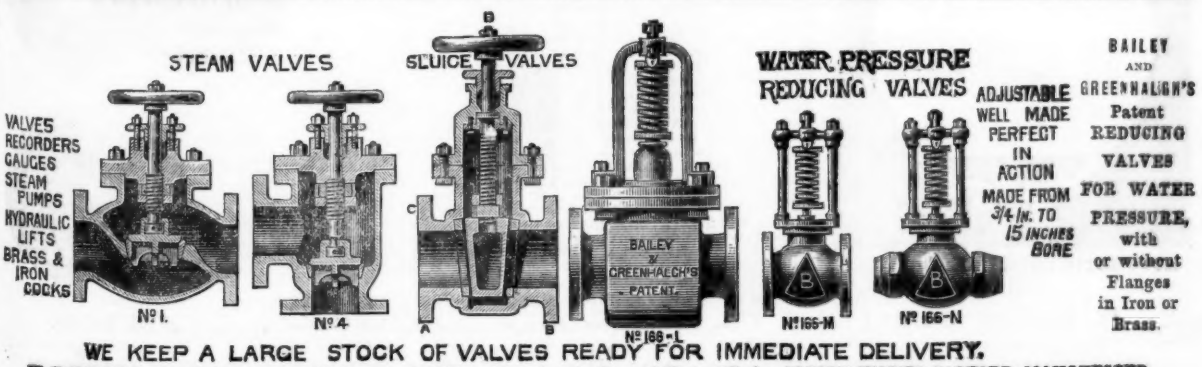
Beg to intimate that the development of their Mines is progressing favourably, and that they are now in a position to supply their famous Cannels.

Quotations and full Analyses will be supplied on application addressed to the Company,

LOCHGELLY, FIFESHIRE, N.B.

Abstract of Analyses made by Dr. WALLACE, Gas Analyst for the City of Glasgow.

	Cubic Feet per Ton.		Illuminating Power.		Equivalent of a Ton in Sperm.
Plesio Boghead	13,165	....	36·16	....	1632
Brown Capledrae	12,210	....	38·46	....	1610



BAILEY AND GREENHALGH'S Patent REDUCING VALVES FOR WATER PRESSURE, with or without Flanges in Iron or Brass.

WE KEEP A LARGE STOCK OF VALVES READY FOR IMMEDIATE DELIVERY.

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THE "RELIANCE,"

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The object attained by this invention is the *correct measurement of Gas under every fluctuation of the pressure.*

Accuracy is obtained by subjecting the whole of the water which determines the measuring chambers of the drum to one uniform even pressure, and so prevents unequal displacements of the water-line.

The "RELIANCE" METER has been tested by several of the most experienced official meter inspectors. Copies of their reports may be obtained on application to the

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WET & DRY GAS METERS.

STATION METERS AND GOVERNORS.

JONES'S THROTTLE-VALVE GOVERNORS.

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The simplest and best Instrument extant for checking Excess of Pressure in hilly districts.

GAUGES AND TESTING APPARATUS OF ALL KINDS FOR GAS.

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Manufacturers of

CONSUMERS IMPROVED WET GAS-METERS,

THE UNVARYING WATER-LINE GAS-METERS,

IMPROVED DRY GAS-METERS, in Cast-Iron or Tin-Plate Cases;

STATION-METERS, ALL SIZES, with PLANED JOINTS;

Experimental Meters, Photometers, Pressure-Gauges, Governors, Test Holders, &c., &c.

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AUTOMATIC GOVERNOR BURNER.

PRESSURE

FROM GASHOLDER TO BURNER.

The Royal Scottish Society of Arts, in 1876, awarded to D. BRUCE PEEBLES the KEITH MEDAL for his inventions relating to Station and District Governors; and, in 1879, the KEITH MEDAL for his invention of the Needle Gas Governor. The Committee appointed by the Society to examine the merits of the Needle Governor, consisting of the following eminent scientific gentlemen, viz.:—Dr. Stevenson Macadam, John Reid, Esq., late of the Edinburgh and Leith Gas-Works, and John Milne, Esq., Milton House, summed up their report by stating, "Your Committee have had the advantage and privilege of experimenting with the Needle Gas Governor, and are convinced that this Governor is the most perfect instrument which has been invented up to this time for controlling the flow of gas."

PEEBLES'S Patent Gas Governors place in the hands of Gas Engineers the means of Controlling Pressure in all situations and circumstances. Safety Station Governors, Metallic Dry District Governors, Metallic Needle Lamp Governors, Consumers Governors, and Domestic Automatic Governor Burners.

WET AND DRY GAS METERS OF SUPERIOR EXCELLENCY, STATION METERS, &c.

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